TECHNICAL MANUAL

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION AND SUPPLEMENTAL OPERATING, MAINTENANCE AND REPAIR PARTS INSTRUCTIONS)

ROLLER MOTORIZED,
STEEL WHEEL2 DRUM
TANDEM, 10-14
TON (CCE)
HYSTER MODEL C350B-D
NSN 3895-00-578-0372

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y

27 MARCH 1981

WARNING: Never shut down the engine when attempting to stop the unit. This will reduce or eliminate all dynamic braking capabilities.

WARNING: Always use extreme caution when positioning scrapers as they are under considerable spring tension and may become sharp when worn.

WARNING: Always support ballast securely when removing or installing ballast mounting capscrews.

WARNING: In order to check the high-pressure relief valve, it is necessary to bring the unit to stall. CAUTION must be taken to ensure the safety of personnel when attempting to stall the unit.

WARNING: Changing the quantity of shims in the relief valves is not recommended.

WARNING: When adjusting the Displacement Control Valve, the drive drum must be safely blocked off the ground. Any movement of the Control Valve Spool causes the unit to shift out of neutral and the drum will turn. CAUTION personnel to stand clear of the drive drum.

WARNING: The brake assembly will be removed prior to drive drum removal. Block the machine safely to prevent movement.

WARNING: When removing the drive drum, take caution. The drive drum is extremely heavy (approximately 12,000 lb., 5440 kg without ballast). CAUTION personnel to stand clear.

WARNING: During transmission start-up procedure, disconnect the cable from the pump until after initial start-up. This will allow the pump to remain in neutral (see figure 7-104).

WARNING: Connect the drum hub to a hoist before removal from the drive drum. The outer planetary assembly will accompany the drum hub upon removal. Care should be taken when handling these components.

WARNING: When assembling the steering control unit, alignment of the cross slot in the drive with the valleys between the teeth of the meter gear star determines proper valve timing of the unit. There are 12 teeth on the spline and 6 pump teeth on the star. Alignment is exactly right in 6 positions and exactly wrong in 6 positions. If the parts slip out of position during this part of assembly, repeat until you are certain correct alignment is obtained (see figure 9-57).

WARNING: DO NOT extend the hands or arms through the center of the steering wheel during start-up after the steering control unit has been reassembled. If the steering control unit has been disassembled and incorrectly timed, the steering wheel may suddenly become motorized or rotate abruptly with extreme force. If this occurs, see figure 9--2 and paragraph 9-27, step t and retime the control unit as shown.

WARNING: When checking water spray motor brushes, be sure ignition key switch and water spray switch are in the OFF position before inspecting brushes.

WARNING: Support heavy components securely BEFORE attempting to remove them.

WARNING: Always block the unit securely to prevent movement while performing maintenance or repairs.

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TECHNICAL MANUAL
NO. 5-3895-348-14&P-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *27 March 1981*

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION AND SUPPLEMENTAL OPERATING, MAINTENANCE AND REPAIR PARTS INSTRUCTIONS)

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM

Tandem 10-14 TON (CCE)

HYSTER MODEL C350B-D

NSN 3895-00-578-0372

CONTRACT NO. DSA700-74-C-9024

REPORTING OF ERRORS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Tank-Automotive Materiel Readiness Command, ATTN: DRSTA-MBS, Warren, MI 48090. A reply will be furnished to you.

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This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

PART I

SERVICE MANUAL

STEEL WHEEL ROLLER C350B

CONTRACT NO. DSA 700-74-C-9024

OPERATING INSTRUCTIONS

C350B STEEL WHEEL ROLLER

Starting

1. Set park brake.
2. Move throttle bail to neutral (vertical position).
3. Start engine.

4. *To Protect Engine and Transmission:*
   Do not operate above half throttle until transmission temperature is over 100°F.

Operating

1. Release park brake.
2. Direction and speed are controlled by bail. Machine will travel in direction bail is moved. Additional bail movement increases speed.
3. To prevent lugging engine on an upgrade move bail back towards neutral position.
4. Use emergency stop, identified on dash in red, only if engine speed cannot be controlled.

Stopping

1. Put throttle bail in neutral (vertical position).
2. Set park brake.
3. Turn ignition switch to off position.

Do not Tow - In case of machine malfunction, vehicle may be moved at slow speed by opening transmission by-pass valve. This is done by pulling up and locking the control cable located under the hood on the hydraulic tank side of the unit.

FOR SAFETY

TRAINED OPERATOR ONLY

1. Use slower speed and added caution when operating close to fill edge and when traveling downhill.
2. Travel up and down the grade when operating on slopes.
3. Report damage and faulty operation immediately, do not operate machine until corrected.
4. Always set park brake before getting off machine. Transmission will not hold parked machine on a grade.
5. Follow the operating instructions above and in the owners and operators manual. Extra copies available from your Hyster dealer.

DIESEL ENGINE GUARANTY CLAUSE
FOR GOVERNMENT CONTRACTS

Notwithstanding the provisions of Clause 5 of the General Provisions, entitled "Inspection", the Contractor guarantees that, at the time of delivery thereof, the supplies provided for under this contract will be free from defects in material or workmanship and will conform to the requirements set forth in the contract. Notice of any alleged defect or non-conformance shall be given by the Government to the Contractor within one (1) year following delivery of the allegedly defective or non-conforming item. The Contractor shall be afforded the opportunity to examine the allegedly defective or non-conforming supplies, or parts thereof, at the site at which the suspected malfunction is experienced or, if field examination cannot be accomplished, such allegedly defective or non-conforming supplies, or parts thereof, shall be returned freight collect via cheapest transportation to the Contractor's plant. The Contractor shall with all possible speed, exchange such supplies, or parts thereof, with supplies or parts of like kind and ship such supplies or parts thereof freight prepaid to the location from which the defective or non-conforming supplies or parts thereof were returned or, if such location is not within CONUS, to the port of embarkation or other location within the original 48 States or the District of Columbia prescribed by the Contracting Officer, provided examination of such supplies or parts thereof discloses to the Contractor's satisfaction that the material received (a) was defective or non-conforming when delivered, or (b) has become defective or non-conforming since delivery for reasons other than as a result of having been (1) improperly repaired, altered or subjected to misuse, negligence, accident, or lack of normal maintenance services, or (2) operated at load factors which, although consistent with the user's duty cycle requirements, are in excess of Detroit Diesel Allison's published commercial ratings for the product. This Guaranty shall then continue as to any such exchange supplies or parts thereof until one (1) year after the date of delivery thereof.

Notwithstanding the foregoing, the Contractor's total liability for transportation charges shall not exceed the cost of transporting the allegedly defective or non-conforming supplies, or parts thereof, by the usual commercial surface method of shipment, from the shipping destination originally specified under this contract for the applicable CLIN to the Contractor's plant and return, and the Government shall reimburse the Contractor for all transportation expense in excess of such amount upon request.

If the Government does not require the exchange of any supplies, or parts thereof agreed to be defective or non-conforming, the Contractor, if required by the Contracting Officer within a reasonable time after notice of the defect or non-conformance, shall repay such portion of the contract price for the supplies as is equitable in the circumstances and comparable to the price(s) at which the Contractor then offers the exchanged supplies, or parts thereof, for sale to the Government.

March 1974

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1. GENERAL.

1-2. This manual contains Operation and Maintenance Instructions for the
C350B Steel Wheel Roller (figure 1-3 and 1-4). Operating instructions must be carefully reviewed and understood before attempting to operate a unit. The individual assigned to operate the unit should see that it is kept in good condition to ensure prolonged efficiency.

1-3. UNIT NAMEPLATE.

1-4. The unit nameplate is located at the front of the operator's compartment as shown in figure 1-4. Make sure the nameplate remains attached to the unit at all times.

NOTE: Make sure that nameplate information is complete. If not, contact a Hyster Dealer.

1-5. SERIAL NUMBER DATA (see figure 1-4).

CAUTION: The COMPLETE serial number must be identified when ordering parts or communicating service information to Hyster Company.

1-6. The unit serial number is located on the unit nameplate. It is also stamped on the left hand side of the gooseneck. The serial number indicates the design series, manufacturing plant, serial number of the unit and year manufactured, Example B89 C 0000 T.

1-7. SYSTEM DESIGN SPECIFICATIONS.

1-8. Design specifications for individual systems of the unit are listed: in Section 2. Maintenance Specifications are given in Section 4.

1-9. OPERATING INSTRUCTIONS.

1-10. All instructions necessary for safe and efficient operation are given in Section 3.

1-11. HYSTER—CARE MAINTENANCE.

1-12. Section 4 Contains the schedule and procedures required for proper maintenance. The schedule lists recommended time intervals between maintenance checks. The procedures provide detailed instructions for performing maintenance checks.

1-13. TROUBLESHOOTING.

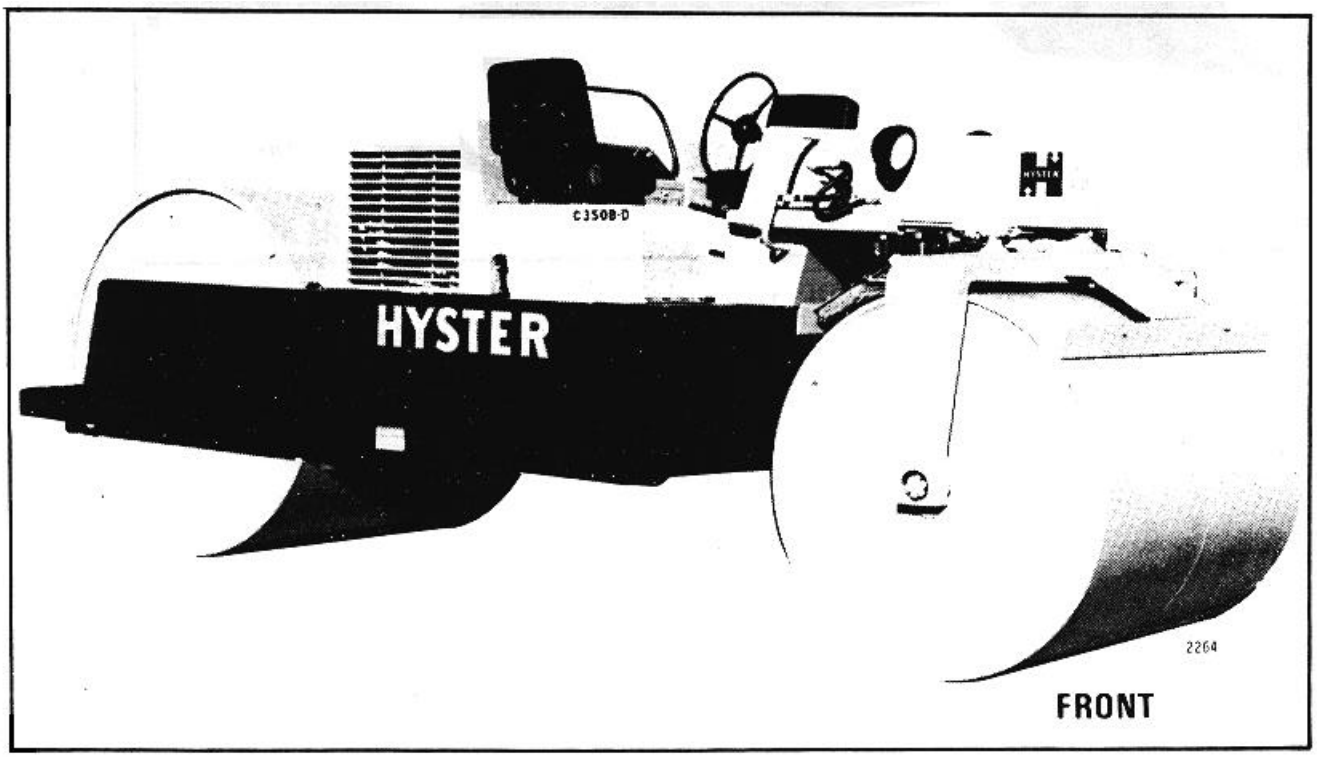

FIGURE 1-3.

1-14. Refer to C350B Service Manual or Section 5 of this publication.

1-15. SYSTEM DESCRIPTIONS AND REPAIRS.

1-16. Refer to C350B Service Manual.

1-17. SAFETY PRECAUTIONS.

1-18. When operating the unit, always observe recommended procedures given on the inside front cover of this manual.

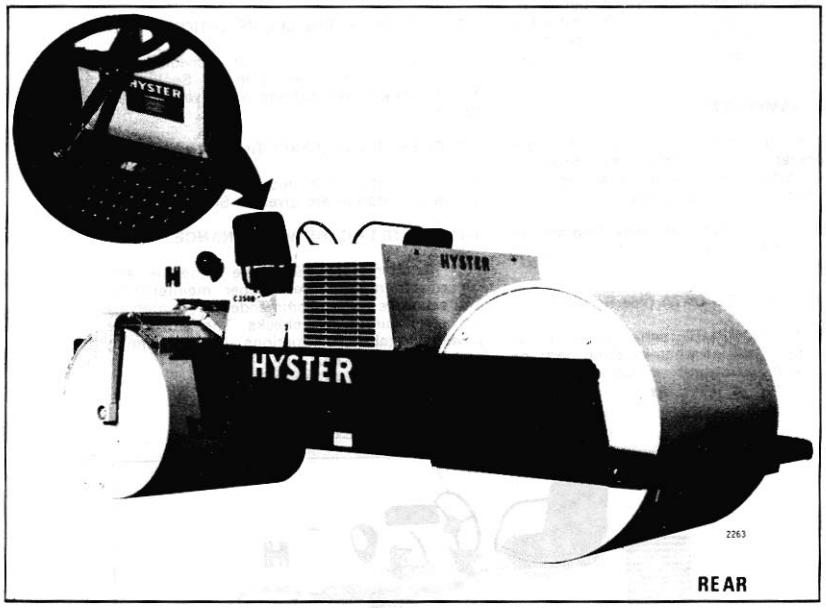

FIGURE 1-4.

2-1. GENERAL.

2-2. This section contains specification tables for each major system of the compactor. Additional specification tables are included for unit dimensions, weight, performance and torques. Following is a list of specification tables included in this section:

TABLE	TITLE
2-1	Compactor Dimensions
2-2	Performance Specifications
2-3	Weight, Ballast Compression Data
2-6	Detroit Diesel Engine Specifications
2-7	Water Spray System Specifications
2-8	Hydrostatic Transmission Specifications
2-9	Final Drive and Drum Assembly Specifications
2-10	Steering System Specifications
2-11	Brake System Specifications
2-12	Torque Specifications for Standard Hardware

TABLE 2-1. COMPACTOR DIMENSIONS (see figure 2-1).

ITEM	DESIGN DATA	
	C350B	
	INCH	(cm)
A. Overall Height	77	(196)
B. Overall Length	197	(500)
C. Overall Width	65	(165)
D. Ground Clearance		
	18	(46)
10–14 Ton C350B	15	(38)
E. Wheelbase	140	(356)
F. Guide Roll Width	54	(137)
G. Guide Roll Diameter	48	(122)
H. Drive Roll Diameter	60	(152)
I. Drive Roll Width	54	(137)
J. Guide Roll Maximum Oscillation		
Going Straight		25° From Level on Each Side
In Full Turn		10° From Level on Each Side
K. Guide Roll Maximum Turn		90° Total (45° Each Side)

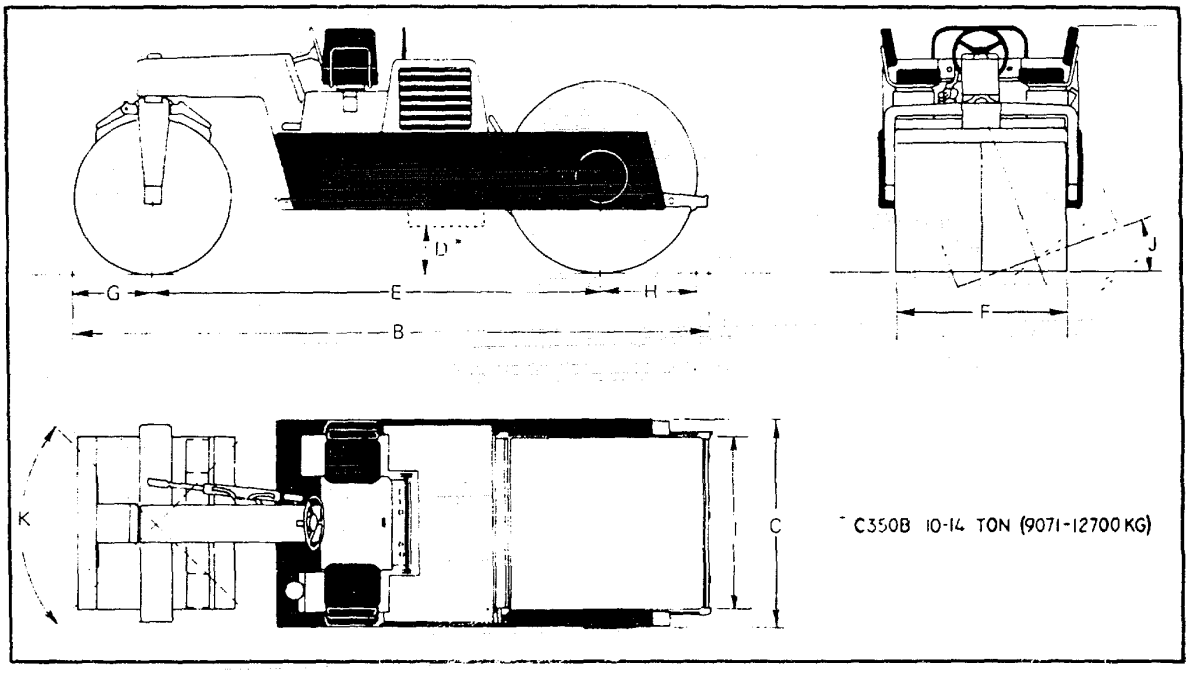

FIGURE 2-1.

TABLE 2-2. PERFORMANCE SPECIFICATIONS.

ITEM	DESIGN DATA	
	C350B	
Maximum Travel Speed	8 MPH (12.9 KMH)	
Inside Turning Radius	150 in. (406 cm)	
Outside Turning Radius	233 in. (592 cm)	

TABLE 2-3. WEIGHT, BALLAST COMPRESSION DATA.

ITEM	DESIGN DATA			
	WITHOUT BALLAST			
	Weight		Compression	
	lb	(kg)	lb lineal inch	(kg lineal cm)
C350B				
10–14 Ton				
Guide Roll	8000	(3629)	148	(264)
Drive Roll	12000	(5443)	222	(396)
Total	20000	(9072)		

TABLE 2-3. WEIGHT, BALLAST COMPRESSION DATA (CONT.)

ITEM	DESIGN DATA	
	WITHOUT BALLAST	
	Weight lb (kg)	Compression lb/lineal inch (kg/lineal cm)
C350B	WITH LIQUID BALLAST	
	Weight lb (kg)	Compression lb/lineal inch (kg/lineal cm)
10–14 Ton		
Guide Roll	11200 (5080)	208 (371)
Drive Roll	16800 (7620)	310 (554)
Total	28000 (12700)	

DELETED PAGE 2-4.

TABLE 2-6. DETROIT DIESEL ENGINE SPECIFICATIONS.

ITEM	DESIGN DATA	
	ENGLISH	METRIC
TYPE	In-Line, 3 Cylinder	
CYCLE	2 Stroke	
BORE	3.875 In.	9.8 cm

TABLE 2-6. DETROIT DIESEL ENGINE SPECIFICATIONS (CONT.).

ITEM	DESIGN DATA	
	ENGLISH	METRIC
STROKE	4.5 In.	11.4 cm
DISPLACEMENT	159.3 Cubic Inches	2610 cc
TORQUE	202 ft.–lbs. at 1500 RPM	27.9 kg–m at 1500 RPM
HORSEPOWER	80 at 2200 RPM	
INJECTORS	N–45	
COMPRESSION RATIO	17 to 1	
IDLE SPEED	550 RPM	
HIGH IDLE SPEED (No Load)	3040 RPM	
FIRING ORDER	1–3–2	
EXHAUST VALVE CLEARANCE	0.025 In. (Cold) 0.023 In. (Hot)	0.635 mm 0.584 mm
OIL PRESSURE (2200 RPM)	30 PSI	2.1 kg/cm^2
THERMOSTAT SETTING	165–185 °F	74–85 °C

NOTE: For additional engine specifications refer to engine manufacturer's service literature.

TABLE 2–7. WATER SPRAY SYSTEM SPECIFICATIONS.

ITEM	DESIGN DATA	
	ENGLISH	METRIC
TANK CAPACITY	200 Gallons	757 Liters
PUMP TYPE	Centrifugal	
OPERATING PRESSURE	7–10 PSI at 800 RPM (Non–adjustable)	0.5–0.7 kg/cm^2 at 800 RPM (Non–adjustable)
NOZZLE FLOW (TOTAL)	Approx. 0.25 GPM	0.95 LPM
NOZZLE ORIFICE	0.040 In.	1.016 mm

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TABLE 2-8B. SUNDSTRAND HYDROSTATIC TRANSMISSION SPECIFICATIONS.

ITEM	DESIGN DATA	
	ENGLISH	METRIC
HYDRAULIC TANK CAPACITY	9 Gallons (also supplies steering)	34 ltrs.
OIL TYPE	SAE 10W Viscosity Index 90 Approved Oils: Mobilfluid 423 Shell Tellus 29 Type "F" Transmission Fluid conforming to Ford Motor Co. specification No. ESW-M2C33F (or E)	
OIL FILTERS		
Suction	10 Micron	
Return	33 Micron	
Oil Cooler By-pass Valve	Opens at 15 PSI	Opens at 1 kg/cm^2

TABLE 2-8B. SUNDSTRAND HYDROSTATIC TRANSMISSION SPECIFICATIONS (CONT.).

ITEM	DESIGN DATA	
	ENGLISH	METRIC
SYSTEM PRESSURES (At 100–150°Oil Temp and 1500–2000 RPM engine speed)		
Charge Pump Pressure (Transmission in Neutral)	190–220 PSI*(Controlled by Relief Package in Charge Pump)	13.4–15.5 kg/cm^2*(Controlled by Relief Package in Charge Pump)
Transmission in Forward or Reverse	150–180 PSI*(Controlled by Relief Package in Hydraulic Motor)	10.5–12.7 kg/cm^2*(Controlled by Relief Package in Hydraulic Motor)
Main Pump Pressure	5500 (± 200) PSI	386.7 (± 14) kg/cm^2
Control Pressure (Transmission in Forward or Reverse)	45 PSI approximately	3.2 kg/cm^2 approximately
Case Pressure	40 PSI Max. (Normally 10 PSI)	2.8 kg/cm^2 (Normally 0.7 kg/cm^2)
Suction Oil	10 In. HG Maximum	25.4 HG Maximum
HYDRAULIC PUMP		
Type	Variable Displacement Axial Piston	
Swashplate Angle	18° Max. Either Side of Center	
Maximum Displacement	4.2 Cubic Inches per Revolution at 18° Swashplate Angle	68.8 cc per Revolution at 18° Swashplate Angle
Maximum Pressure Rating	5500 PSI	386.7 kg/cm^2
Maximum Case Pressure	40 PSI	2.8 kg/cm^2
Minimum Main Port Pressure	130 PSI Above Case Pressure	9.1 kg/cm^2 Above Case Pressure
Maximum Allowable Case Temperature	180° F	
Maximum Shaft Speed		
At No Load	3000 RPM	
At 4700 PSI (330.5 kg/cm^2)	2810 RPM	
Charge Check Flow Rating	10 GPM	37.9 LPM
Charge Pump Displacement	0.75 Cubic Inch Per Revolution 9 GPM Max. at High Idle	12.3 cc Per Per Revolution 34.1 LPM Max. at High Idle
Port Sizes		
Main Line Inlet/Outlet Ports (2)	3/8–16 Thread, Four Bolt, Split–flange Boss	9.525 mm–16 Thread, Four Bolt, Split–flange Boss
Case Ports (Inlet and Outlet)	7/8–14 UNF–2B, O–ring Boss	22.225 mm–14 UNF–2B, O–ring Boss
Charge Pump Inlet	7/8–14 UNF–2B, O–ring Boss	22.225 mm–14 UNF–2B, O–ring Boss
Control Lever Movement	26° Either Direction from Center	

* Above case pressure

TABLE 2-8B. SUNDSTRAND HYDROSTATIC TRANSMISSION SPECIFICATIONS (CONT.).

ITEM	DESIGN DATA	
	ENGLISH	METRIC
HYDRAULIC MOTOR		
Type	Fixed Displacement, Axial Piston	
Displacement	4.26 Cubic Inches at 18° Pump Swashplate Angle	69.8 cc at 18° Pump Swashplate Angle
Charge Pressure Relief Valve setting	150–180 PSI	10.5–12.7 kg/cm^2
Main Relief Valve Setting	5500 PSI Above Charge Pressure	386.7 kg/cm^2 Above Charge Pressure
Port Sizes		
Main Line Inlet/Outlet Ports (2)	3/8–16 Thread Four Bolt, Split–flange Boss	9.525 mm–16 Thread, Four Bolt Split–flange Boss
Case Drain Port	7/8–14 UNF–2B, O–ring Boss	22.225 mm–14 UNF–2B, O–ring Boss

TABLE 2–9. FINAL DRIVE AND DRUM ASSEMBLY SPECIFICATIONS.

ITEM	DESIGN DATA	
	C350B	
FINAL DRIVE GEAR RATIO	60.1: 1	
LUBRICATION		
Type	SAE 90 Multi–purpose Gear Oil	
Quantity	4 Quarts (3.8 ltrs.)	
GEAR TOOTH DATA		
Inner Sun Gear	17 Teeth	
Inner Planet Gears	47 Teeth	
Ring Gear	108 Teeth	
Outer Sun Gear (Cage)	29 Teeth	
Outer Planet Gears	47 Teeth	
GEAR BEARING BORE		
Inner Planet Gears	1.9800–1.9810 In. 50.317 – (50.292 mm)	
Outer Planet Gears	2.5312–2.5322 In. (64.292–64.318 mm)	
PLANETARY SHAFT O.D.		
Inner Planet Gears	0.9998–0.9993 In. (25.395–25.382 mm)	
Outer Planet Gears	1.1868–1.1873 In. (30.145–30.157 mm)	

TABLE 2-9. FINAL DRIVE AND DRUM ASSEMBLY SPECIFICATIONS (CONT.).

ITEM	DESIGN DATA	
	C350B	
PLANETARY SYSTEM TORQUE		
Inner Planet Capscrews	15 ft.–lbs. (2.073 kg–m)	
Outer Planet Capscrews	15 ft.–lbs. (2.073 kg–m)	
Drum Hub Capscrews	120 ft.–lbs. (16.584 kg–m)	
Planet Anchor Flange Capscrews	200 ± 10 ft.–lbs. (27.64 ± 1.38 kg–m)	
Anchor Flange to Outer Planetary Hub 12 Point Capscrews	120 ft.–lbs. (16.584 kg–m)	
MOTOR HOUSING TORQUE		
Housing to Frame Capscrews	88 ft.–lbs. (12.162 kg–m)	
Motor Mounting Capscrews	115 ft.–lbs. (15.893 kg–m)	
Bearing Carrier to Drum Capscrews	130 ft.–lbs. (17.966 kg–m)	
Bearing Carrier to Lock–plate Capscrews	105 ft.–lbs. (14.511 kg–m)	
Bearing Carrier Shimming	0.002 In. (0.0508 mm) Preload to 0.003 In. (0.0762 mm) End Play	

TABLE 2–10. STEERING SYSTEM SPECIFICATIONS.

ITEM	DESIGN DATA	
	ENGLISH	METRIC
SYSTEM TYPE	Hydrostatic	
HYDRAULIC TANK CAPACITY	9 Gallons (also supplies transmission)	34 ltrs.
OIL TYPE	SAE 10W Viscosity Index 90 Approved Oils: Mobilfluid 423 Shell Tellus 29 Type "F" Transmission Fluid conforming to Ford Motor Co. specification No. ESW–M2C33F (or E)	
RELIEF PRESSURE		
Detroit Diesel	1500 ± 50 PSI	105.5 ± 3.5 kg/cm^2

TABLE 2-10. STEERING SYSTEM SPECIFICATIONS. (CONT.).

ITEM	DESIGN DATA	
	ENGLISH	METRIC
RELIEF VALVE SETTING	1500 PSI	105.5 kg/cm^2
HYDRAULIC PUMP		
(Detroit Diesel Only)		
Type	External Gear	
Pump Output at 2400 Engine RPM and no Pressure Restriction	18.6 GPM **NOTE**: Flow divider controls to 6.5 ± 1.0 GPM.	70.4 LPM **NOTE**: Flow divider controls to 24.6 ± 4 LPM.
ROTATION VIEWED FROM SHAFT END	Counterclockwise	
PUMP DIMENSIONS		
Gear Diameter	2.1965–2.1970 In.	55.791–55.804 mm
Gear Width	1.1545–1.550 In.	29.324–39.370 mm
Gear Lash	0.006–0.010 In.	0.152–0.254 mm
Gear to Body	0.00175 In.	0.043 mm
Body Bore	2.199–2.200 In.	55.855–55.880mm
Bearing Diameter	2.1970–2.1975 In.	55.804–55.817mm
Bearing Bore	0.995–1.000 In.	25.273–25.400 mm
Bearing Width	1.9990–1.9993 In.	50.775–50.782 mm
Bearing to Shaft	Total 0.0025 In.	Total 0.0635 mm
Between Flats	0.0002–0.0005 In.	0.0051–0.0127 mm
FLOW DIVIDER		
(Detroit Diesel Only)		
Input Rating	30 GPM	114 LPM
Controlled Flow	6.5 ± 1.0 GPM	25 ± 4 LPM
Relief Setting	1500 ± 50 PSI	105.5 ± 3.5 kg/cm^2
STEERING CYLINDER		
Type	Double Acting	
Stroke	18 ± 1/8 Inches	45.7 ± 0.3 cm

TABLE 2-10. STEERING SYSTEM SPECIFICATIONS (CONT.).

ITEM	DESIGN DATA	
	ENGLISH	METRIC
STEERING WHEEL TURNS (Stop to Stop)	2 1/4 Clockwise (3 Seconds Clockwise and 3.5 Seconds Counterclockwise)	
STEERING HANDPUMP		
Type	Open Center, Rotary Actuated	
Displacement	7.4 Cubic Inches per Revolution	121.3 cc per Revolution
Port Size	3/4–16 UNF (All Ports)	19.05 mm–16 UNF (All Ports)
GUIDE ROLL STEERING ANGLE (Full Turn)	45° Each Side	
CLEARANCE BETWEEN GUIDE ROLL DRUMS	0.010–0.030 In.	0.25–0.76 mm
TRUNNION TORQUE		
Steering Axle Nuts	200, then 45 ft.–lbs.	27.6, then 6.2 kg–m
Oscillation Pin Nut	200, then 75 ft.–lbs.	27.6, then 10.4 kg–m
King Pin Nut	200, then 75 ft.–lbs.	27.6, then 10.4 kg–m
Trunnion Capscrews	200 ft.–lbs.	27.6 kg–m

TABLE 2–11. BRAKE SYSTEM SPECIFICATIONS.

ITEM	DESIGN DATA	
	ENGLISH	METRIC
BRAKE DRUM DIAMETER	10.0 In.	25.4 cm
BRAKE LINING THICKNESS	0.25 In.	0.64 mm
LINING TYPE	Segmented, Riveted	
BRAKE LEVER ADJUSTMENT	80 Lbs. Min. Pull	36.3 kg–Min. Pull
BACKING PLATE CAPSCREWS	49 ft.–lbs.	6.8 kg–m
BRAKE HUB TO BRAKE DRUM CAPSCREWS	49 ft.–lbs.	6.8 kg–m
BRAKE SHAFT NUT	100 ft.–lbs.	13.8 kg–m

TABLE 2-12. TORQUE SPECIFICATIONS FOR STANDARD HARDWARE.

SAE GRADE 5 CARBON STEEL CAPSCREWS											
FOOT-POUNDS (U.S.)						KILOGRAM-METERS (EUROPEAN)					
	TORQUE			TORQUE			TORQUE			TORQUE	
SIZE	UNC	UNF	SIZE	UNC	UNF	SIZE	UNC	UNF	SIZE	UNC	UNF
1/4	6	7	3/4	200	220	1/4	0.83	0.97	3/4	27.66	30.43
5/16	13	14	7/8	300	320	5/16	1.80	1.94	7/8	41.49	44.26
3/8	23	25	1	440	480	3/8	3.18	3.46	1	60.85	66.38
7/16	35	40	1-1/8	600	660	7/16	4.84	5.53	1-1/8	82.98	91.28
1/2	55	65	1-1/4	840	920	1/2	7.16	8.99	1-1/4	116.17	127.24
9/16	80	90	1-3/8	1100	1260	9/16	11.06	12.45	1-3/8	152.13	174.26
5/8	110	130	1-1/2	1460	1460	5/8	15.21	17.98	1-1/2	201.92	226.81
SAE GRADE 8 CARBON STEEL CAPSCREWS AND PLACEBOLTS											
1/4	9	10	3/4	280	320	1/4	1.24	1.38	3/4	38.13	44.26
5/16	18	20	7/8	460	500	5/16	2.49	2.77	7/8	63.62	69.15
3/8	35	35	1	680	740	3/8	4.84	4.84	1	94.04	102.34
7/16	55	60	1-1/8	960	1080	7/16	7.61	8.29	1-1/8	132.77	149.36
1/2	80	90	1-1/4	1360	1500	1/2	11.06	12.45	1-1/4	188.08	207.45
9/16	110	130	1-3/8	1780	2040	9/16	15.21	17.98	1-3/8	246.17	282.13
5/8	170	180	1-1/2	2360	2660	5/8	23.51	24.89	1-1/2	326.39	356.81

NOTE This table lists torque values for standard hardware and is intended as a guide for average applications involving typical stresses and machined surfaces. Values are based on the physical limitations of clean, plated and lubricated hardware. In all cases, when an individual torque value is specified, it should take priority over values given in this table. Replace original equipment with hardware of equal grade.

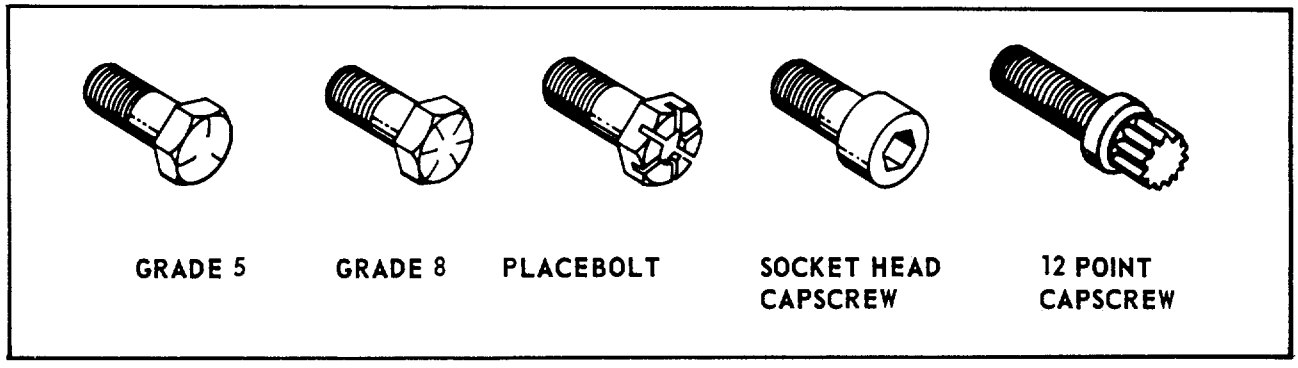

FIGURE 2-2. TYPES OF HARDWARE.

3-1. GENERAL.

3-2. This section contains instructions necessary for operation of the C350B Steel Wheel Roller. These instructions must be carefully reviewed and understood before attempting to operate the unit. Also, new operators must be thoroughly trained by a skilled operator before attempting to operate the unit unassisted.

3-3. The individual assigned to operate the compactor should always maintain it in good mechanical condition to ensure prolonged efficiency. Report any mechanical failures immediately for correction. Even minor failures or damage may eventually result in major failures if uncorrected.

NOTE: Follow all operating instructions in the order given on the operating instructions decal (see figure 3-3).

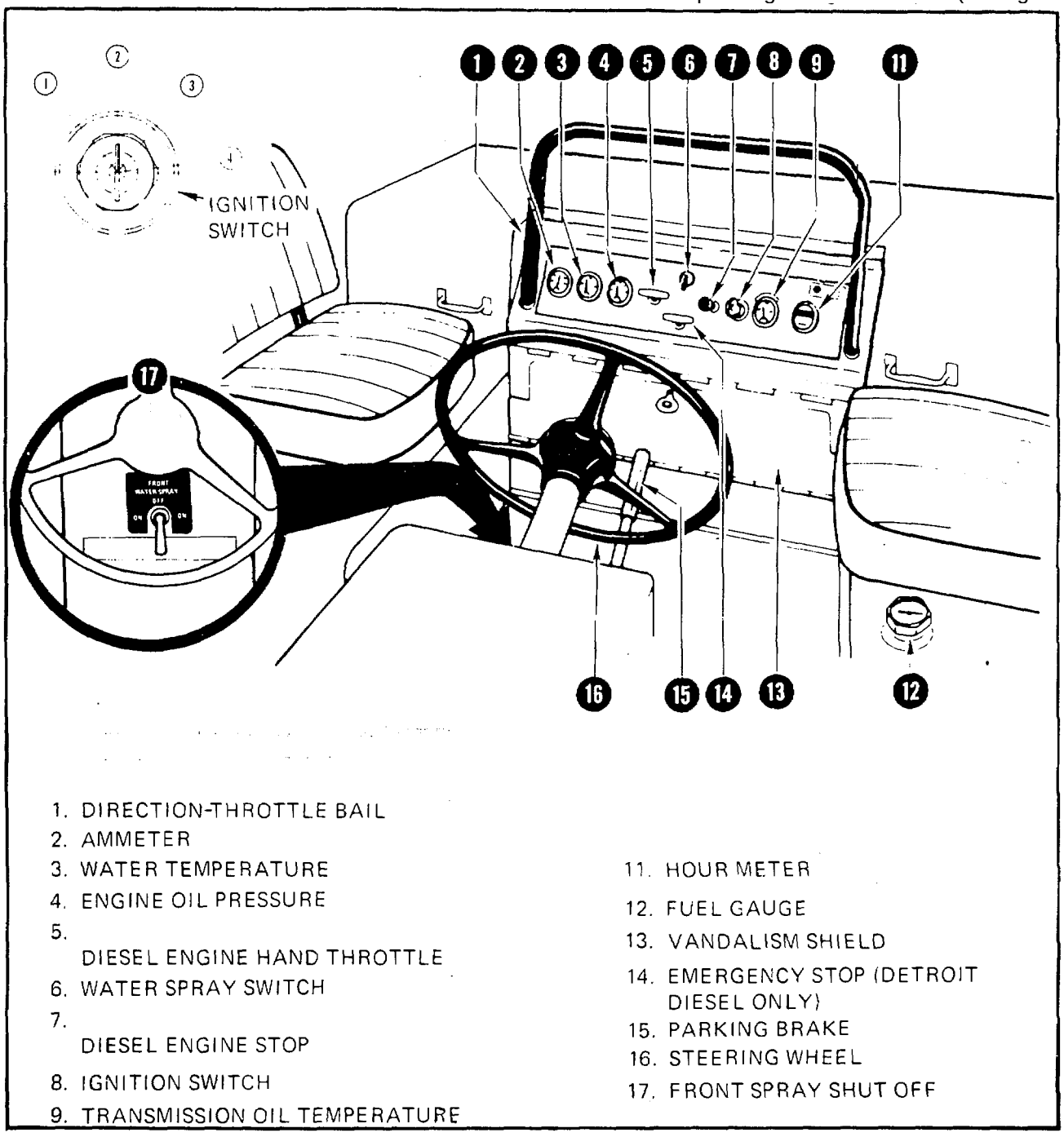

FIGURE 3-1. OPERATING CONTROLS AND INDICATORS

TABLE 3-1. OPERATING CONTROLS AND INDICATORS.

FIGURE 3-1 INDEX NO.	NOMENCLATURE	TYPE	FUNCTION
1	DIRECTION-THROTTLE BAIL	Cross-bar with mechanical linkage to fuel system and transmission control.	Controls direction and speed of compactor. Vertical position detents and transmission in Neutral. Moving lever toward Guide Roll from Neutral causes unit to move forward. Moving lever toward Drive Roll from Neutral causes unit to move in reverse direction. Distance lever is moved from Neutral determines engine and unit speed. This lever also acts as a means for dynamic braking of the unit.
2	AMMETER	Gauge.	Indicates output current of alternator. Gauge may show slight discharge (RED) at idle, but should indicate charge (GREEN) when engine speed is increased.
3	ENGINE WATER TEMPERATURE	Gauge.	Indicates temperature of water circulating through engine. Needle should point to the white or cold operating band when engine is first started. After warmup period, needle should register in the green operating band. If needle registers in the red band, stop operation and correct the cause of the overheating condition.
4	ENGINE OIL PRESSURE	Gauge.	Indicates pressure of the oil being pumped through engine. Gauge may indicate high pressure when engine is first started but should drop to normal level as engine warms. Stop engine immediately if no pressure is indicated while engine is running.
5	DIESEL ENGINE HAND THROTTLE	Push-Pull Lever.	HAND THROTTLE - Controls engine speed independently of Direction-Throttle Bail. Use for cold starting conditions and to regulate initial warmup speed.
6	WATER SPRAY SWITCH	Toggle Switch.	Engages or disengages water spray system.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS (CONT.).

FIGURE 3–1 INDEX NO.	NOMENCLATURE	TYPE	FUNCTION
7	DIESEL ENGINE STOP	Push–Pull Lever.	ENGINE STOP – Shuts off diesel fuel flow for engine shutdown.
8	IGNITION SWITCH	Four–position, Key–operated Interlock Switch.	No. 1 Position: Accessory Position. Applies power to water spray switch. No. 2 Position: OFF position. Removes all power to electrical circuits. No. 3 Position: ON position. Applies power to all electrical circuits. This position is also a lockout position. Prevents accidental engagement of the starter motor when engine is running. Ignition Key must be rotated back past this position to the No. 2 (OFF) position before starter motor can be energized again. No. 4 Position: Start position. Applies power to starter motor to crank engine. Switch spring–returns to No. 3 position when key is released.
9	TRANSMISSION OIL TEMPERATURE	Gauge.	Indicates temperature of oil flowing through hydrostatic transmission and steering systems. Shut down unit if gauge pointer moves to RED zone.
10			**CAUTION:** Do not use starting fluid and cold start aid together. It may damage engine components.
11	HOUR METER	Gauge.	Indicates total hours of engine operation.
12	FUEL	Gauge.	Indicates quantity of fuel remaining in fuel tank.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS (CONT.).

FIGURE 3–1 INDEX NO.	NOMENCLATURE	TYPE	FUNCTION
13	VANDALISM SHIELD	Hinged Panel.	Protects controls, engine compartment, and battery against vandalism.
14	EMERGENCY STOP (Detroit Diesel only)	Push–Pull Lever.	Shuts down engine if engine RPM cannot be controlled by Direction–Throttle Bail. This control shuts off air to engine. Lever must be manually re–set at the engine. (Refer to paragraph 3–28.) **CAUTION:** The EMERGENCY STOP should be used ONLY in the event of serious engine malfunctions.
15	PARKING BRAKE CONTROL LEVER	Overcenter Lever.	In BRAKE ON position (up), lever holds park brake shoes in "applied" position. In BRAKE OFF position (down), lever releases linkage that holds park brake shoes in "applied" position.
16	STEERING WHEEL	Power.	Controls oil flow to and from steering cylinder (Hydrostatic steering).
17	FRONT SPRAY SHUT–OFF CONTROL	Gate Valve.	Shuts off water supply to guide roll when water spray is required only on drive roll.

3-4. OPERATING CONTROLS AND INDICATORS.

3-5. The controls and indicators necessary for operation of the compactor are listed and described in Table 3-1 and illustrated in figure 3-1 .

3-6. SAFETY PRECAUTIONS.

3-7. Always observe the following safety precautions to prevent possible injury to personnel and damage to the equipment.

a. TRAINED OPERATORS ONLY.

b. Always use slower unit speeds and added caution when operating close to a lift edge or when traveling downhill.

c. Never travel across a slope. Always travel up or down a grade.

d. Always set the park brake before dismounting the unit.

e. Never shut down the engine when traveling downhill. Always move the Direction-Throttle Bail toward the "neutral" position to slow the unit.

f. Report damage and faulty operation immediately. Do not operate the unit until corrected.

g. Make sure the operating decal is attached to the unit as shown in figure 3-3. make sure that the markings on the decal are legible.

3-8. STARTING THE UNIT (see figure 3-1).

a. Set the park brake by moving the control lever to BRAKE ON position (UP).

b. Place the Direction-Throttle Bail in Neutral detented position (vertical).

c. Pull Hand Throttle out slightly (at approximately a 700 RPM setting).

NOTE: During cold weather conditions it may be necessary to proceed as follows:

Detroit Diesel Engine; Consult manufacturers service literature.

d. Turn the Ignition Key fully clockwise to engage the starter.

CAUTION: Do not crank the engine for more than THIRTY SECONDS at any or e time. If the engine fails to start, set the IGNITION key to off and wait one (1) minute - allowing the starter to cool.

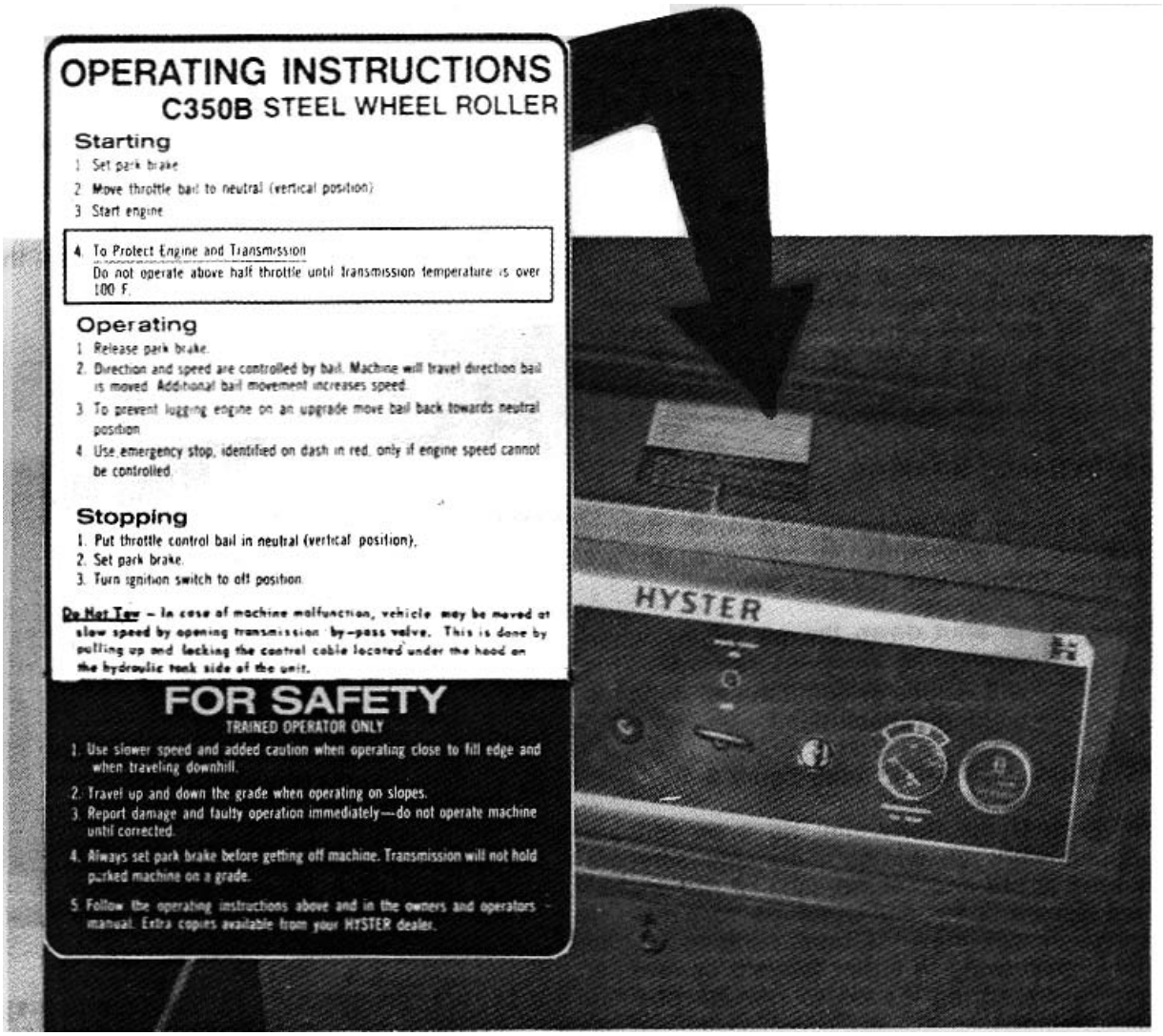
OPERATING INSTRUCTIONS
C350B STEEL WHEEL ROLLER
Starting
1 Set park brake
2 Move throttle bail to neutral (vertical position)
3 Start engine
4 To Protect Engine and Transmission
Do not operate above half throttle until transmission temperature is over 100 F.
Operating
1 Release park brake.
2. Direction and speed are controlled by bail. Machine will travel direction bail is moved. Additional bail movement increases speed.
3 To prevent lugging engine on an upgrade move bail back towards neutral position
4 Use emergency stop, identified on dash in red, only if engine speed cannot be controlled.
Stopping
1. Put throttle control bail in neutral (vertical position).
2. Set park brake.
3. Turn ignition switch to off position.
Do Not Tow – In case of machine malfunction, vehicle may be moved at slow speed by opening transmission by-pass valve. This is done by pulling up and locking the control cable located under the hood on the hydraulic tank side of the unit.
FOR SAFETY
TRAINED OPERATOR ONLY
1. Use slower speed and added caution when operating close to fill edge and when traveling downhill.
2. Travel up and down the grade when operating on slopes.
3. Report damage and faulty operation immediately—do not operate machine until corrected.
4. Always set park brake before getting off machine. Transmission will not hold parked machine on a grade.
5. Follow the operating instructions above and in the owners and operators manual. Extra copies available from your HYSTER dealer.
HYSTER

FIGURE 3-3. OPERATING INSTRUCTIONS DECAL.

NOTE: If the Detroit Diesel engine fails to start after the third attempt, check the EMERGENCY STOP Control has been manually reset as described in paragraph 3-28.

3-9. OPERATING THE UNIT (see figure 3-1).

NOTE: Before operating the unit, allow the engine to idle at 700 RPM for approximately two minutes to allow engine and hydraulic oil to begin to reach operating temperature.

3-10. Release the park brake by pushing the control lever to the BRAKE OFF position (down),

3-11. SPEED AND DIRECTION CONTROL.

3-12. Speed and direction of the unit are controlled by the Direction-Throttle Bail (figure 3-1). Move the Direction-Throttle Bail off of "neutral" in the desired direction (forward or reverse). To increase unit speed, move the lever further away from the "neutral" position. To decrease unit speed, move the lever back toward the "neutral" position.

NOTE: Optimum torque to the drive drum is achieved by moving the Direction-Throttle Bail toward the '`neutral" position when the engine starts to lug down. Move bail until engine RPM increases to loaded RPM speed.

3-13. DYNAMIC BRAKING.

3-14. Slowing or stopping the unit during operation is accomplished by moving the Direction-Throttle Bail toward "Neutral".

WARNING: Never shut down the engine when attempting to stop the unit. This will reduce or eliminate all dynamic braking capabilities.

3-15. DRUM SCRAPERS (see figure 3-4).

3-16. Both Guide Rolls and the Drive roll are equipped with full width, adjustable scrapers mounted ahead and behind each of the drums. These scraper bars are designed to keep the large pieces of material from clinging to the rolls when moving in either forward or reverse. Scrapers are spring loaded to provide positive drum contact.

3-17. All four scraper bars have an "off-the drum" locking position. To lock any of the four scrapers into the "off-the-drum" position:

1. Pull scraper away from the drum.

2. Move the pawl into the lock position.

3. Slowly move the scraper towards the drum until the pawl holds the scraper.

WARNING: Always use extreme caution when positioning scrapers as they are under considerable spring tension and may become sharp when worn.

3- 18. COCO MATS (See figure 3-4).

3-19. A full width COCO mat is located on each roll and is used in conjunction with the water spray system to keep the rolls clean.

3-20. Both coca mat arrangements have "off-the-drum" locking positions. To lock either of the two coca mats "off-the-drum, ":

1. Pull or lift the coca mat off of the drum.

2. Engage the mat hook in the mat link.

3. Slowly move the coco mat towards the drum until the mat hook holds the mat.

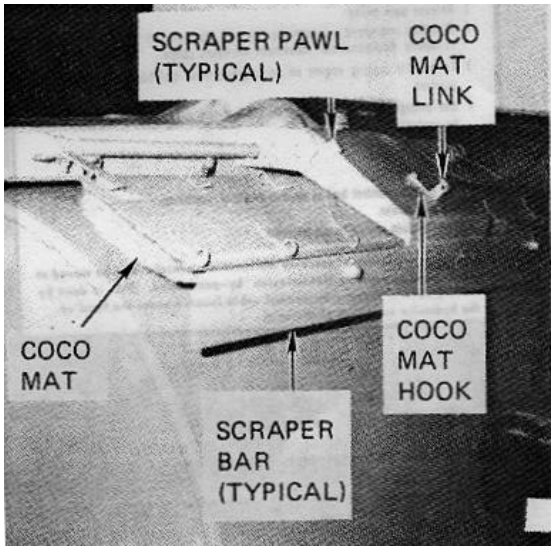

FIGURE 3-4.

3-21. WATER SPRAY SYSTEM (see figure 3-1).

3-22. The water spray system is designed to help keep the drums clean when rolling asphalt. To activate

the water spray system, push the water spray switch to the ON position. This will produce pressurized water spray on the Guide Roll and Drive Roll drums. The pressurized supply to the Guide Roll drum can be turned off (if conditions dictate) by rotating the Front Spray Shut-off lever. The water spray switch should be in the OFF position when the water spray system is not needed.

CAUTION: Do Not operate water system without water. Damage to pump may result.

3-23. UNIT SHUTDOWN (see figure 3-1).

a. Set the Direction-Throttle bail to the "neutral" position.

b. Set the Park Brake Control Lever to the BRAKE ON position (UP).

c. Set the IGNITION key to the "off" (vertical) position.

d. On units equipped with a diesel engine, pull the ENGINE STOP out. Hold in this position until the engine stops.

NOTE: If the Detroit Diesel engine fails to stop, pull out the EMERGENCY STOP lever. Reset the control as specified in paragraph 3-28. Troubleshoot the system to determine the malfunction bed fore operating the unit again.

e. Position the Vandalism Shield over the instrument panel. If the unit is to be left unattended, lock the shield.

3-24. EMERGENCY ENGINE STOP (Detroit Diesel Only) (see figure 3-1).

3-25. A manually operated EMERGENCY STOP Control is mounted on the instrument panel to shut down the Detroit Diesel engine in the event of a serious engine malfunction. If the engine continues to run after the ~ ENGINE STOP has been pulled out, or if the engine overspends, the shut-down device will prevent damage to the engine by cutting off the air supply and thus stop the engine.

3-26. The shut-down device (figure 3-5) consists of an air shut-off valve mounted in the engine air inlet housing. The shut-off valve is retained in the open position by a latch. A cable connected to the EMERGENCY STOP control is used to remotely trip the latch, closing the shut-off valve.

3-27. RESETTING EMERGENCY ENGINE STOP (Detroit Diesel Only) (see figure 3-5).

3-28. The emergency engine stop must be manually reset before the engine can be restarted. To reset the emergency stop, push the cam-pin handle (located on the engine air inlet housing) downward. This will open the shut-off valve. Then push the EMERGENCY STOP Control lever against the instrument panel.

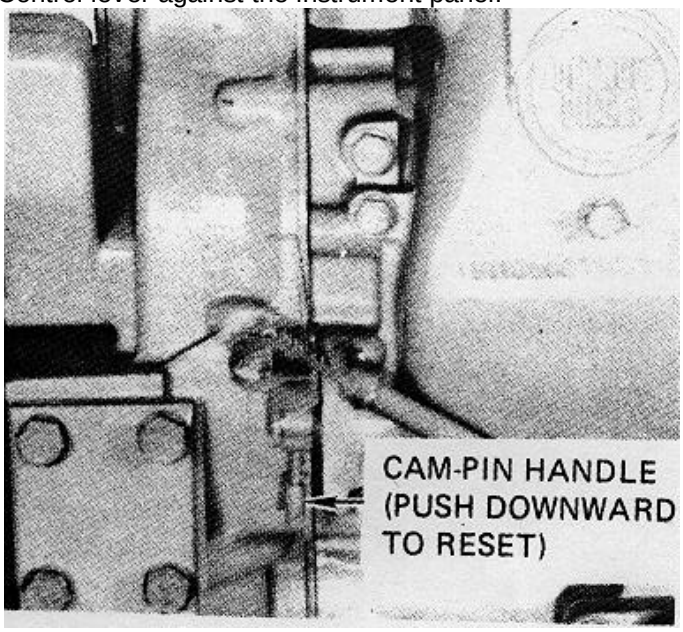

FIGURE 3-5.

3-29. MOVING THE UNIT (see figure 3-6).

3-30. Before moving a malfunctioning unit, the transmission by-pass valve MUST be opened. If the valve is not opened, the drive drum will have restricted movement.

Rotate the slotted cam 90 degrees clockwise. On units equipped with a Sundstrand Transmission, pull up and lock the control cable located under the hood on the hydraulic tank side of the unit.

CAUTION: The by-pass valve is not intended for towing a unit from one jobsite to another. Tow at speeds of one (1) to two (2) M PH (1.61-3.22 km/in) for as short a distance as possible.

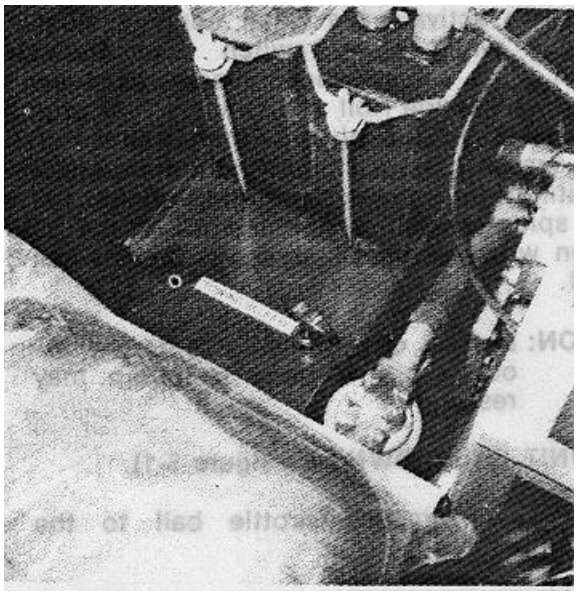

FIGURE 3-6. SUNDSTRAND TRANSMISSION BY-PASS VALVE ON DIESEL UNITS.

3-31. SHIPPING THE UNIT.

3-32. When shipping the roller, the four tie down eyes should be used. One eye is located at each end of the rear scraper bar mount and under each operator mounting step in front. The drive roll should be blocked front and rear and on both sides. The guide rolls must be blocked on both sides.

CAUTION: Do not block the guide rolls front and rear as it will shock load the trunnion king pin and bearings.

3-33. MISCELLANEOUS OPERATING POINTS.

a. Using the hood as an arm rest will ensure smooth control.

b. No more than two people are allowed on the machine when operating.

c. Do not use the steering wheel or direction-throttle bail as machine mounting assists.

d. Always look in the direction of travel.

4-1. GENERAL.

4-2. This section contains instructions necessary for proper Hyster-Care Maintenance for the C350B Steel Wheel Roller. Hyster-Care Maintenance is divided into two subsections: Hyster-Care Maintenance Schedule and Hyster-Care Maintenance Procedures. The maintenance schedule lists the recommended time intervals between maintenance checks. The procedures subsection provides detailed instructions for performing the maintenance checks. Instructions listed in the procedures subsection are given by systems and are not necessarily in the order listed in Table 4-1.

4-3. Hyster-Care Maintenance is a planned maintenance program that: includes periodic inspection and lubrication. Hyster-Care maintenance should be correlated closely with the operating hours recorded on the hourmeter located on the instrument panel.

4-4. HYSTER-CARE MAINTENANCE SCHEDULE.

4-5. Table 4-1 lists the recommended maintenance checks. It is outlined in two schedules: the hourly schedule and the periodic schedule. If the unit is operated more than eight hours per day, the hourly schedule should be followed. If the unit is operated less than eight hours per day, the periodic schedule should be followed.

4-6. Maintenance checks given in Table 4-1 are listed in the same sequence as listed on the maintenance decal starting with the eight hour checks. The first and last columns of the table

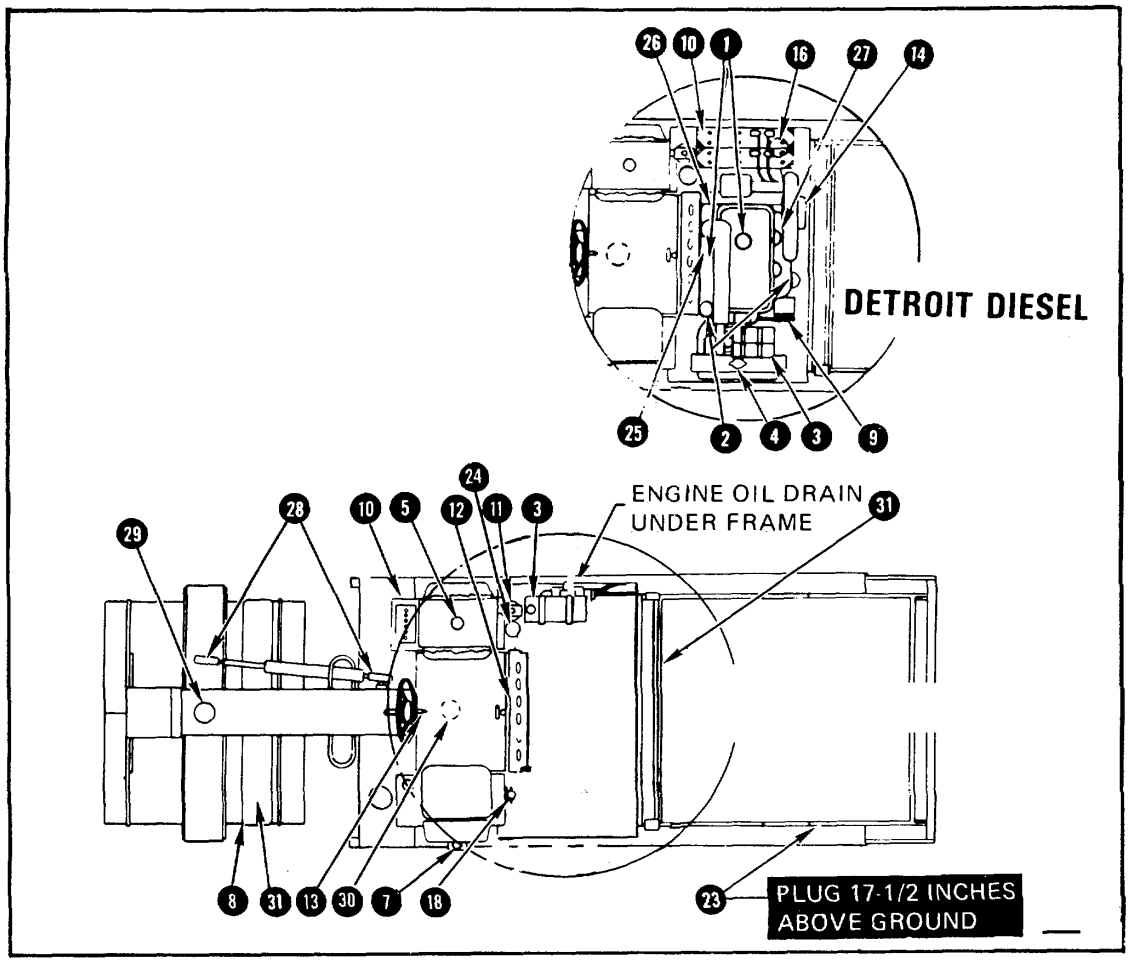

FIGURE 4-1. MAINTENANCE CHECKPOINTS.

TABLE 4-1. HYSTER-CARE MAINTENANCE SCHEDULE.

FIGURE ITEM NO.	ITEM	SCHEDULE HOUR/PERIOD 8/ day	50/ wk	100/ 2wks	200/ mo	300/ 6wks	500/ 3mo	1000 yr	QUANTITY	TYPE	REFER TO PARA-GRAPH
1	ENGINE OIL +									**NOTE:** Refer to engine manufac-turer's maintenance manual for engine oil specifications. MIL-L-2104C	4-56
	DETROIT DIESEL 3-53	X		C							
2	FUEL STRAINER AND FILTER (D) +	X				C				SEE PARTS MANUAL	4-8 +
3	AIR CLEANER FILTER +							C		SEE PARTS MANUAL **NOTE:** Check air restriction indicator on Detroit Diesel	4-20
	DETROIT DIESEL	X						C			
								C			
4	COOLING SYSTEM +							C	16 Qts.(15.1 ltr.)	Winter: Water and ethylene gylcol base anti-freeze with rust inhibi-tors and anti-foaming qualities. Summer: Water and rust inhibitor. MIL-O-A-548	4-40
	DETROIT DIESEL	X						C			
								C			
5	HYDRAULIC OIL TANK	X						C	9 Gals.(34.1 ltr.)	Approved Oils: MIL-L-2104B Mobilfluid 423 Shell Tellus 29 Type "F" transmission fluid conforming to Ford Motor Co. spec. #ESW-M2C33F or E	

TABLE 4-1. HYSTER-CARE MAINTENANCE SCHEDULE (CONT.).

FIGURE ITEM NO.	ITEM	SCHEDULE HOUR/PERIOD							QUANTITY	TYPE	REFER TO PARA-GRAPH
		8/ day	50/ wk	100/ 2wks	200/ mo	300/ 6wks	500/ 3mo	1000/ yr			
7	FUEL TANK	X							25 Gals. (94.6 ltr.)	No. 2 Diesel fuel + MIL-VV-F-800	
8	GUIDE ROLL AXLE BEARINGS	X							A. R.	Multi-purpose Grease MIL-G-10924B	4-95
9	DRIVE BELTS		X								4-36 4-72
10	BATTERY			X					A. R.	Distilled Water	4-32
11	TRANSMISSION SUCTION FILTER			X				C25		SEE PARTS MANUAL	4-69
12	THROTTLE AND TRANS-MISSION LINKAGE			X					A. R.	Engine Oil MIL-L-2104C	4-61
13	PARKING BRAKE LEVER (Lube and Adjustment)			X					A. R.	Multi-purpose Grease MIL-G-10924B	4-82
14	THROTTLE CONTROL MECHANISM (D) +			X					A. R.	Multi-purpose Grease MIL-G-10924B	+
16	ENGINE OIL FILTER + DETROIT DIESEL			C						SEE PARTS MANUAL	4-59

TABLE 4-1. HYSTER-CARE MAINTENANCE SCHEDULE (CONT.).

FIGURE ITEM NO.	ITEM	SCHEDULE HOUR/PERIOD							QUANTITY	TYPE	REFER TO PARA-GRAPH
		8/ day	50/ wk	100/ 2wks	200/ mo	300/ 6wks	500/ 3mo	1000/ yr			
-23	FINAL DRIVE (Oil Bath)						X	C	(C350B) 6 Qts. (5.7 ltr.)	SAE 90 Multi-purpose gear oil. MIL-L-2105B	4-87
24	TRANSMISSION RETURN FILTER							C25		SEE PARTS MANUAL	4-71
25	ENGINE BLOWER SCREEN (D) +							X			4-27+
26	ENGINE CRANKCASE BREATHER (D) +							X			4-25+
27	ENGINE AIR BOX DRAIN (D)+							X			4-29+
28	STEERING CYLINDER BALL JOINTS							X	¼ lb. (.11 kg)	Multi-purpose Grease MIL-G-10924B	4-99
29	STEERING TRUNNION BEARINGS							X	3 lbs. (1.36 kg)	Multi-purpose Grease MIL-G-10924B	4-97
30	WATER SPRAY FILTERS							A.R.			4-75
31	WATER SPRAY NOZZLES							A.R.			4-78

X = Check.
C = Change.
C25 = No. next to C indicates hours for first change.
A.R. = As Required.
(D) = Detroit Diesel engine.
+ = Refer to engine manufacturer's manual for complete instructions.

should be used to locate the applicable maintenance procedure. Figure 4-1 shows the location of all maintenance points.

4-7. HYSTER-CARE MAINTENANCE PROCEDURES.

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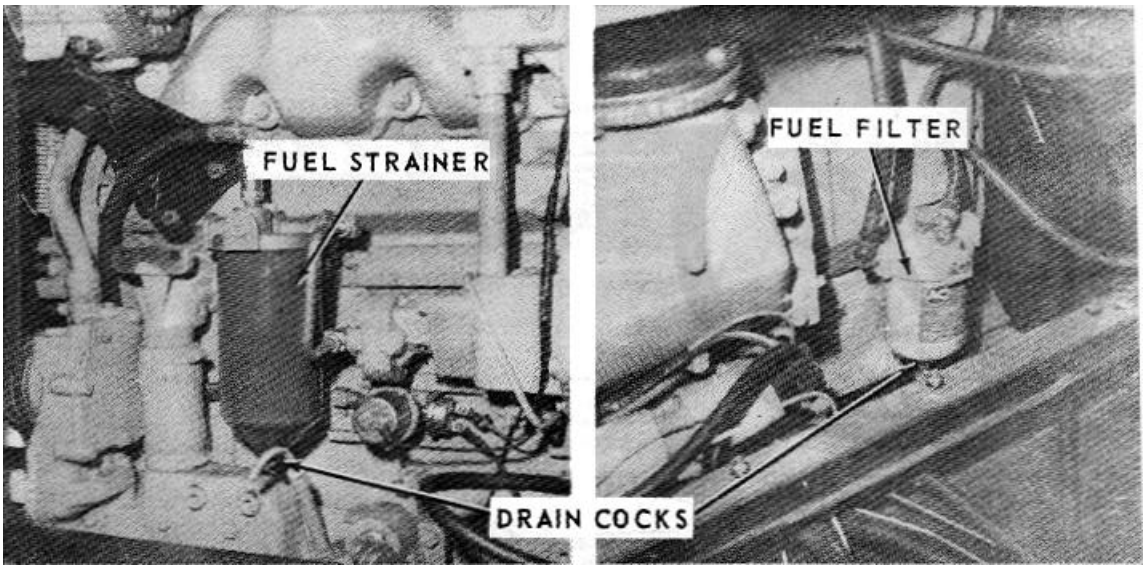


FIGURE 4-6. DETROIT DIESEL FUEL FILTER AND FUEL STRAINER.

4-17. DETROIT DIESEL FUEL STRAINER AND FILTER (see figure 4-6).

4-18. Drain approximately 1/4 pint of fuel from each filter bowl daily to remove dirt and water accumulations. A drain cock is located in the bottom of each filter bowl for this purpose. The filter elements in the strainer and filter must be replaced at the time interval specified in Table 4-1. Replace the elements as follows:

a. With the engine shut down, place a suitable container under the bowl of the strainer or filter and open the applicable drain cock. The fuel will drain more freely if the retaining nut at the inlet/outlet head is loosened slightly.

b. Support the bowl, then unscrew the retaining nut and remove the bowl and element.

c. Remove and discard the element and gasket. Clean the bowl with fuel oil and dry thoroughly with a clean, lint-free cloth and compressed air.

d. Place a new filter element, that has been thoroughly soaked in clean fuel oil, over the stud and push the element down onto the seat. Close the drain cock and fill the bowl approximately two-thirds full of clean fuel oil.

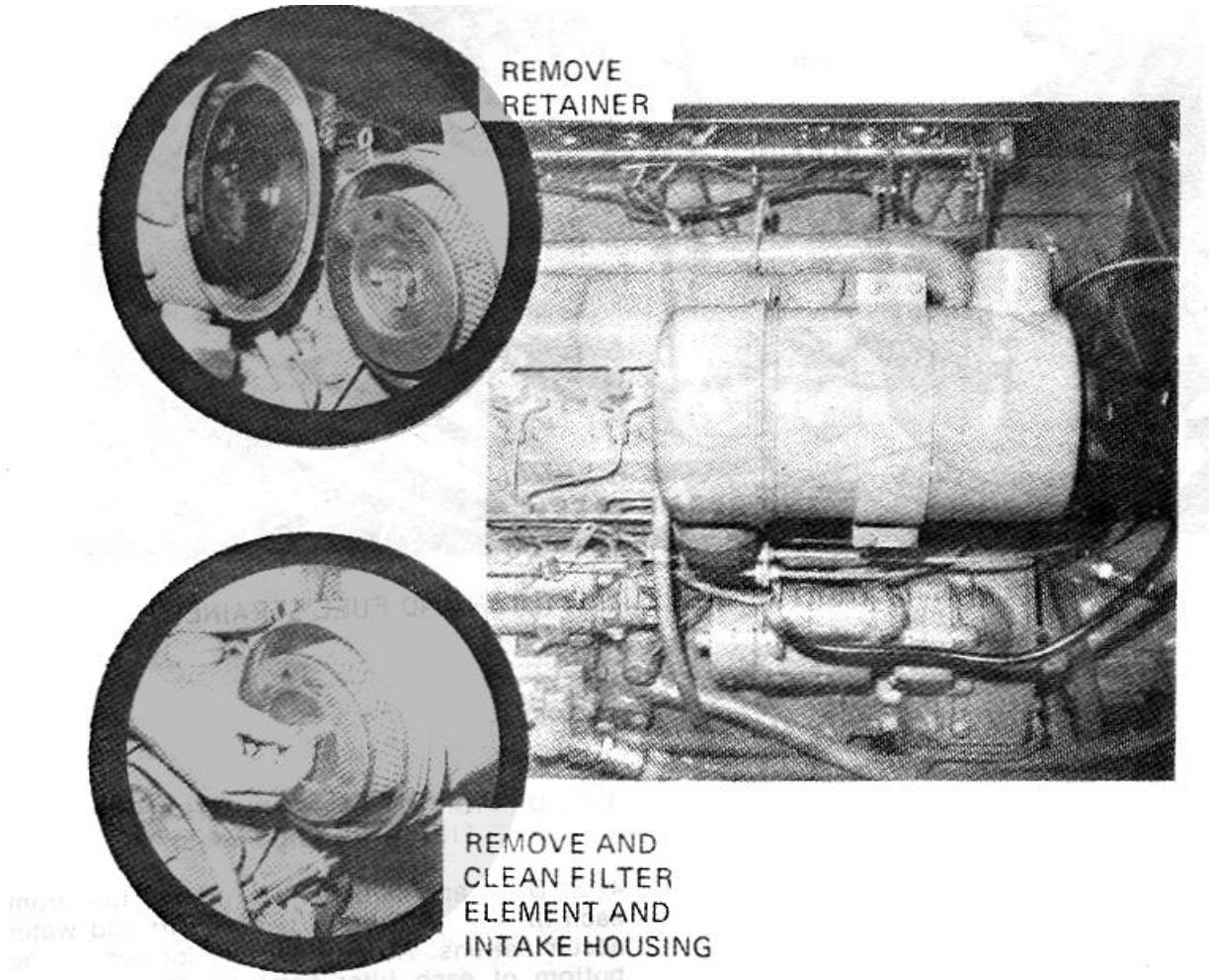


FIGURE 4-7. AIR CLEANER MAINTENANCE.

e. Install a new gasket in the inlet/outlet head. Place the bowl with element into position under the inlet/outlet head and start the retaining nut into the bowl stud.

f. Tighten the retaining nut only enough to prevent fuel leakage. Remove the plug in the inlet/outlet head and fill the bowl with clean fuel oil.

4-19. AIR FILTRATION SYSTEM.

4-20. AIR CLEANER FILTERS(S) (see figure 4-7).

4-21 .

The Detroit Diesel restriction indicator should be checked every eight hours of operation, or daily.

4-22. The air cleaner element is a reusable element that can be cleaned periodically. The element should be replaced, however, after ten cleanings or when the specified change interval occurs. Remove and clean the element as follows:

NOTE: Clean the exterior of the air cleaner body before disassembly.

a. Loosen the retainer bar securing the element. Then remove the retainer bar from the housing.

b. Remove the element from the housing.

c. Tap the element lightly against a smooth surface while keeping it parallel to the surface to avoid damage to the end cap.

d. Blow out the element in the opposite direction of normal air flow using compressed air. Do not exceed 30 PSI (2.1 kg/cm2) air

pressure against the element.

e. Carefully inspect the dry element for damaged paper pleats by placing a light inside of the element. Replace element if it is damaged or after ten cleanings.

f. Clean the intake housing with a lint-free cloth moistened with cleaning solvent before installing element.

g. On Detroit Diesel units, reset the restriction indicator by pushing the reset button at the end of the indicator body after reassembly.

h. Check rubber dust unloading valve for cracks, clogging or deterioration.

4-25. DIESEL CRANKCASE BREATHER (see figure 4-9).

4-26. Remove the crankcase breather from the engine each 1,000 hours of operation and wash the breather in clean fuel oil. Dry thoroughly with compressed air. Also clean the breather cap, mounted on the valve rocker arm cover, in clean fuel oil every time the engine oil is changed.

4-27. DETROIT DIESEL BLOWER SCREEN (see figure 4-10).

4-28. Inspect the blower screen each 1,000 hours of operation. If necessary, clean the screen in clean fuel oil and dry thoroughly with compressed air. Reinstall the screen and gasket assembly with the screen side of the assembly toward the blower.

4-29. ENGINE AIR BOX DRAIN (see figure 4-11).

4-30. With the engine running, check for flow of air from the air box drain tubes each 1,000 hours of operation. If the tubes are clogged, remove, clean and reinstall the tubes. The air box drain tubes should be cleaned periodically even though a clogged condition is not apparent.

4-31. ELECTRICAL SYSTEM.

4-32. CHECKING BATTERY ELECTROLYTE LEVEL.

4-33. The electrolyte level in each battery cell should never be below the top of the plates. If the level is low, add drinking water. The electrolyte level is correct when filled to the bottom of the split ring in each cell.

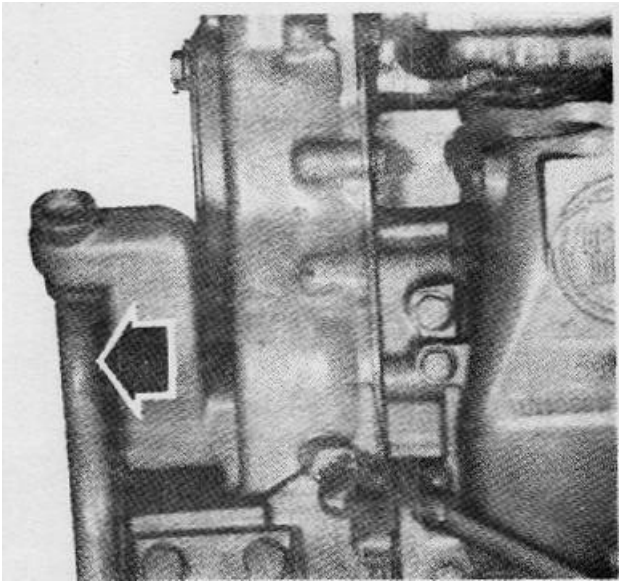


FIGURE 4-9. DIESEL CRANKCASE BREATHER.

4-36. ALTERNATOR AND WATER PUMP DRIVE BELT(S).

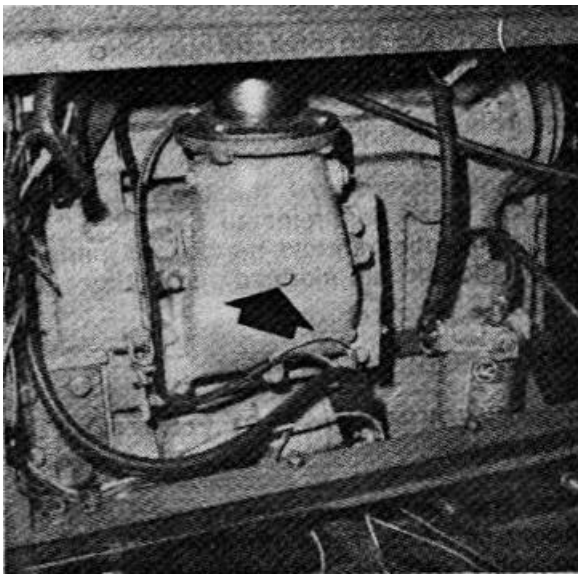


FIGURE 4-10. SERVICING DETROIT DIESEL- BLOWER SCREEN.

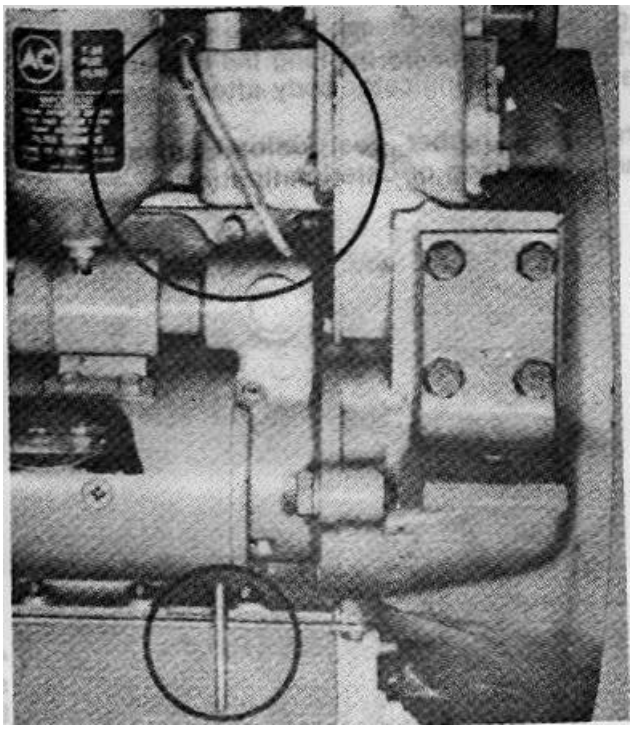


FIGURE 4-11. DETROIT DIESEL AIR BOX DRAIN TUBES.

4-37. Examine the belt(s) for cracks on the inner surface of the plys before making tension adjustments. A belt that is adjusted too tight places an added load on the water pump and alternator bearings, as well as the belt. A belt that is too loose allows slippage, premature failure of the belt and may lower the output of

the charging system. The drive belt(s) should be checked and adjusted after each 50 hours of operation or weekly. The alternator belt(s) should deflect 1/4 inch (6.35 mm) with six pounds (2.7 kg) of force.

CAUTION: (Detroit Diesel Only) Replace both alternator drive belts when one or both needs replacing.

4-38. ELECTRICAL WIRING (see figure 4-14) .

4-39. Periodically inspect all wiring for: Proper routing, loose terminal connections, cracks, wear, faulty insulation, brittleness, and that they are free from oil and grease. Electrical components should be connected per the schematic drawing (figure 4-14) when components are replaced.

CAUTION: Do not use a wire smaller than the original factory installed wires.

4-40. COOLING SYSTEM (see figure 4-15).

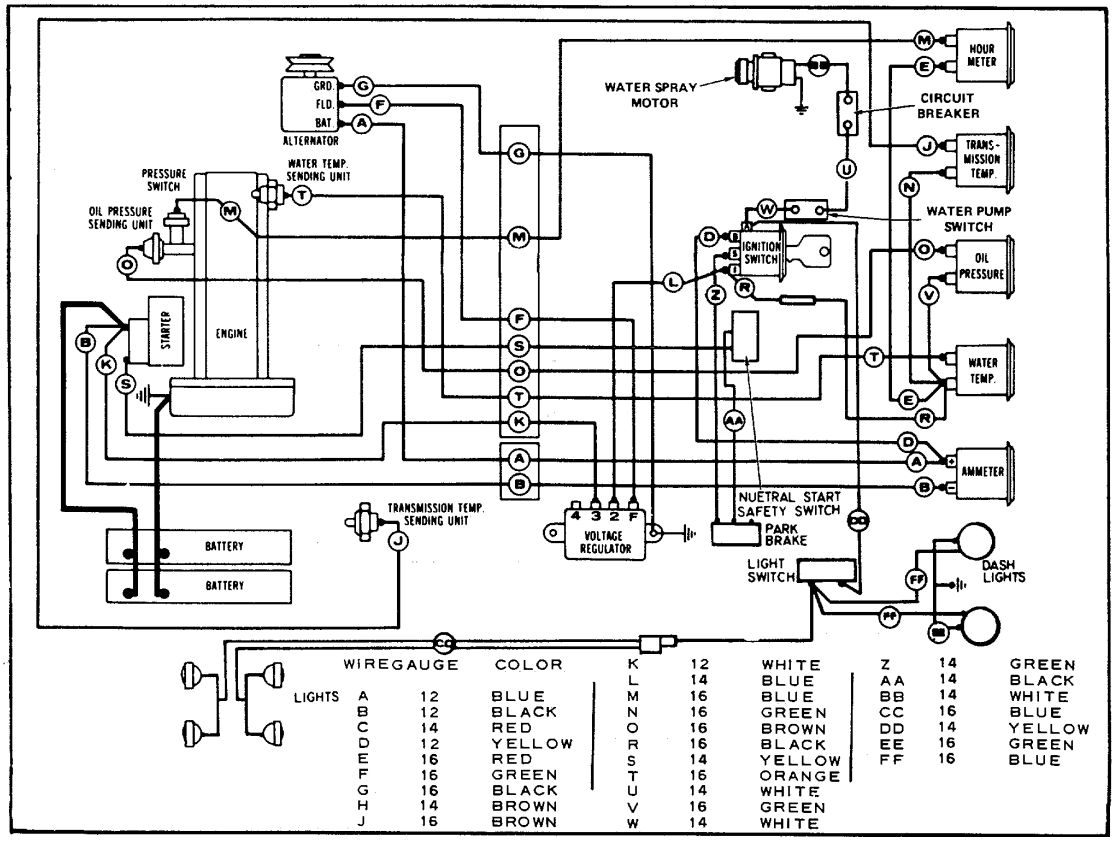


FIGURE 4-14.. ELECTRICAL SYSTEM SCHEMATIC (WITH DIESEL ENGINE)

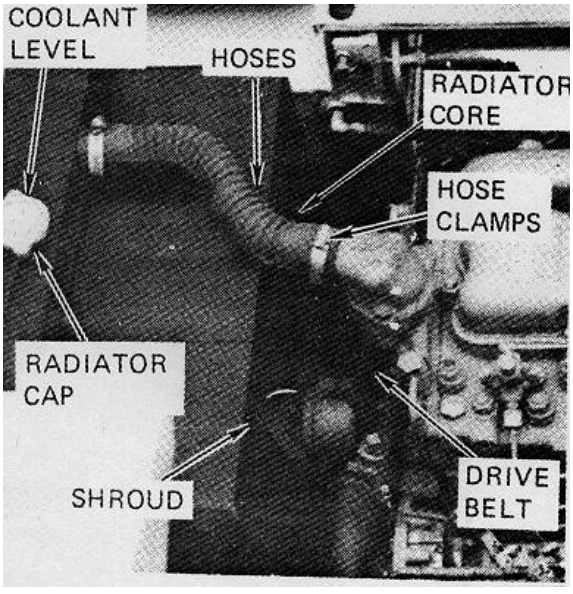


FIGURE 4-15. CHECKING Cooling SYSTEM.

4-41. RADIATOR.

4-42. The radiator should be filled to one inch (2.54 cm) below the filler neck.

4-43. The radiator core must be serviced if it becomes clogged at any point where light cannot be seen through the core. Blow out thoroughly with compressed air, then steam clean if facilities are available. Apply the air or steam to the side opposite of normal air flow. Be careful not to bend the radiator fins. If fins are bent, straighten carefully.

4-44. The radiator cap gasket and filler neck seat must also be checked to be sure that they are providing the proper seal. If the rubber face of the valve is damaged, a new cap must be installed. Always install a cap having a 7 PSI (0.53 kg/cm2) pressure rating. Always inspect the overflow pipe for restrictions. A plugged or damaged pipe may prevent the cap from venting excess pressure.

4-45. FAN SHROUD.

4-46. The fan shroud directs air flow through the radiator with a minimum loss of air due to turbulence. On Detroit Diesel units, the four capscrews securing the shroud can be loosened so that the shroud can be moved up or down for proper positioning with respect to the fan blades. DO NOT ALTER, ADD TO, OR REMOVE THE SHROUD. Check to see that it is anchored securely and not bent from its original shape. The depth that the fan penetrates into the shroud is critical and should not be altered.

4-47. WATER PUMP.

4-48. The water pump should be checked for leaks after each 50 hours of operation. Water pump leaks may allow air to be drawn into the cooling system. This can cause foaming or overheating. Repair or replace the pump immediately if leakage occurs.

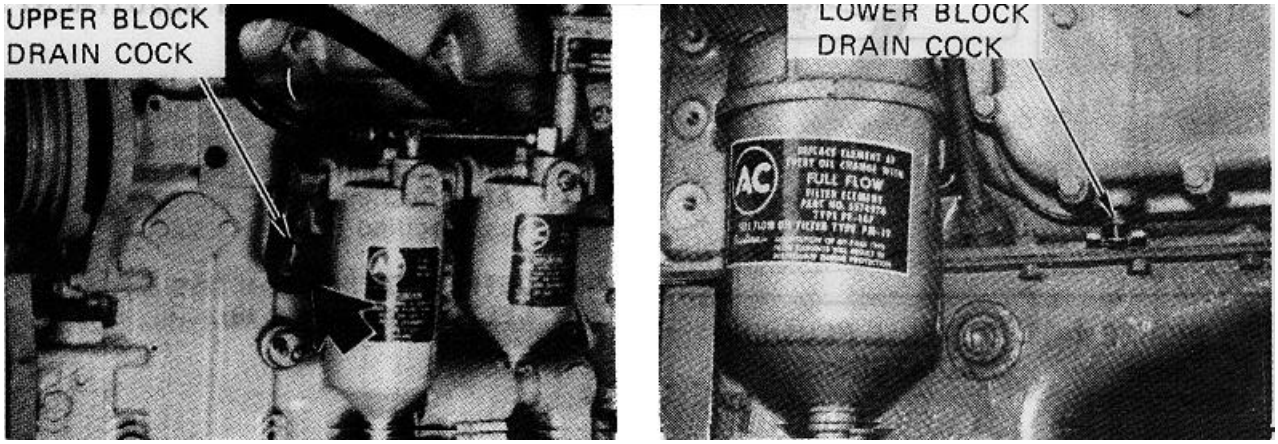
4-49. HOSES.

4-50. Examine hoses at least twice each year for cracks, hardening, softening and swelling. Remove the hose and check the interior section. Hoses can deteriorate on the inside and appear satisfactory on the outside. The

Hose, must be pliable and able to pass coolant without restriction.

4-51. FLUSHING THE SYSTEM.

4-52. Rust in the radiator or coolant indicate c that the corrosion inhibitor has lost its effectiveness. This can be avoided by draining and flushing the system at least once each year. For effective flushing, remove the radiate, hoses and the thermostat. Open the engine



DETROIT 5-53

FIGURE 4-16. ENGINE COOLANT DRAIN COCKS.

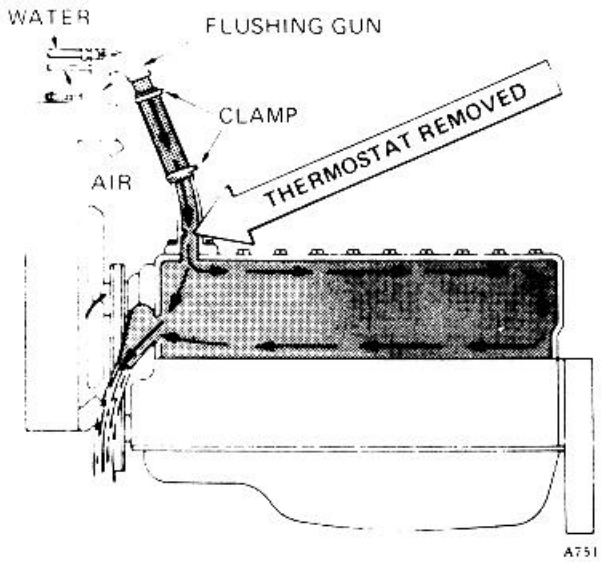


FIGURE 4-17. REVERSE FLUSHING ENGINE BLOCK.

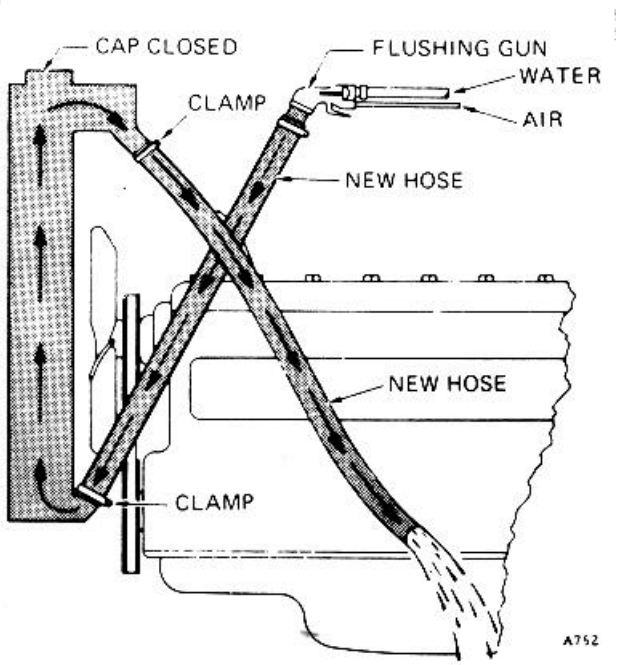


FIGURE 4-18. REVERSE FLUSHING RADIATOR.

drain cock (see figure 4-16) and allow the block to drain. Close the drain cock and reverse flush the block as shown in figure 4-17. Reverse flush the radiator as shown in figure 4-18.

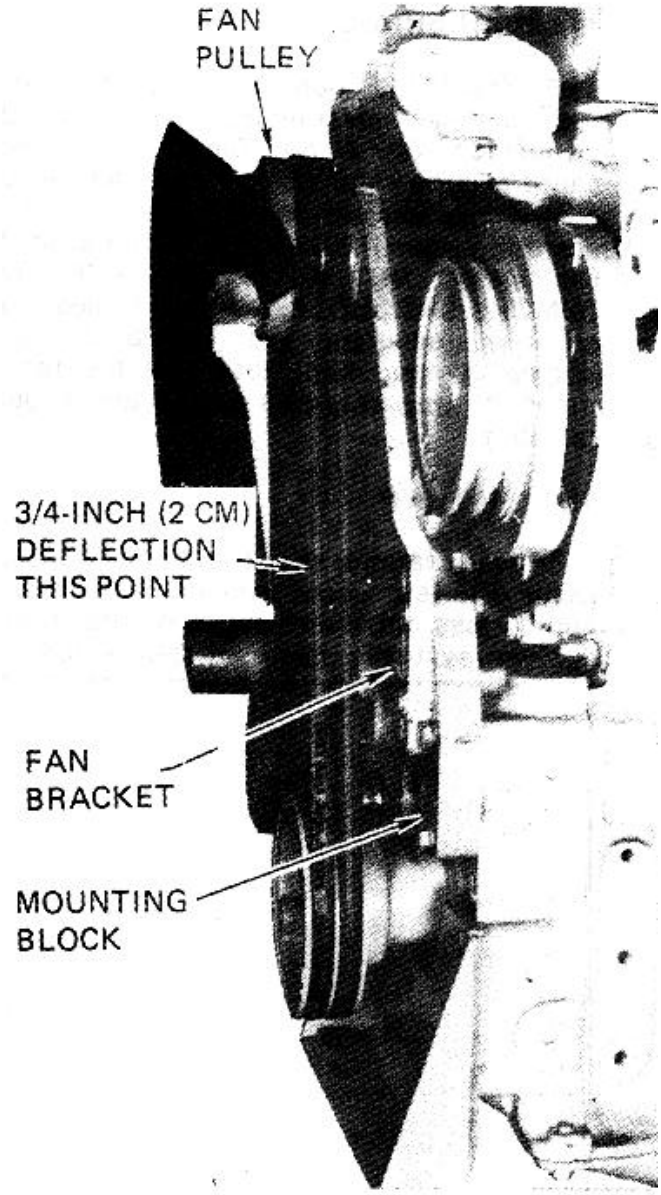
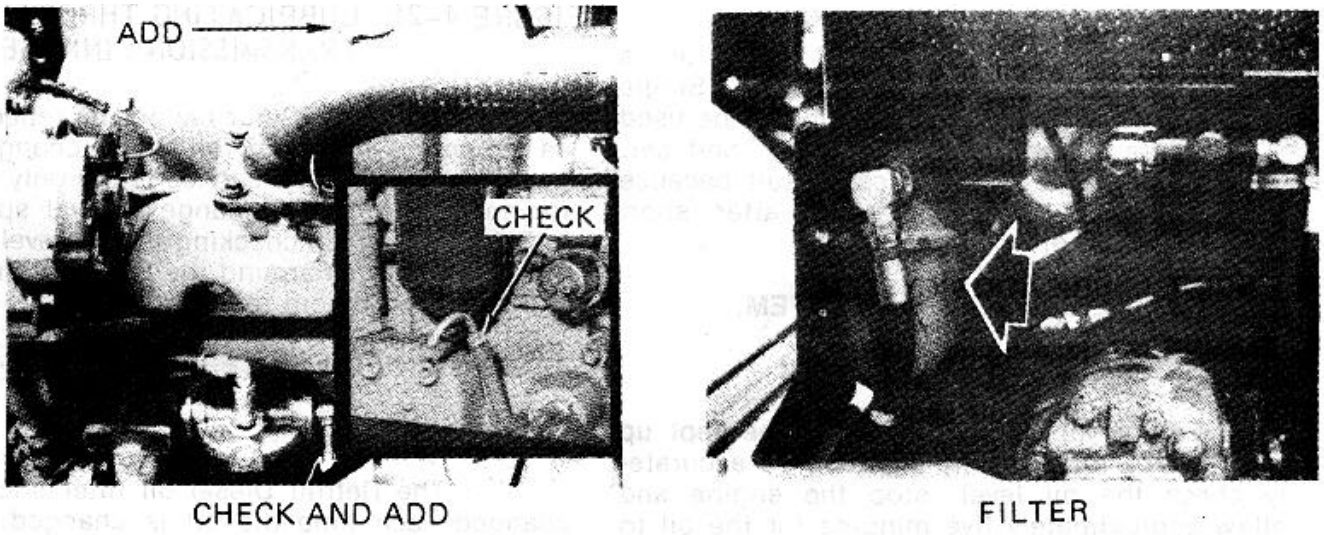


FIGURE 4-19. DETROIT DIESEL FAN BELT ADJUSTMENTS.

NOTE: Make sure that the thermostat is removed. Flushing as shown in figure 4-17 will close the thermostat and prevent complete flushing of the block. After flushing the system, add coolant as specified in Table 4-1.

4-53. DETROIT DIESEL FAN DRIVE BELTS (see figure 4-19).

4-54. Examine the belt for cracks on the inner



DETROIT 3-53

FIGURE 4-20. CHECKING AND CHANGING ENGINE OIL AND FILTER.

plys before making tension adjustments. The fan drive belts should be checked and adjusted after each 50 hours of operation, or weekly.

4-55. New drive belts will stretch after the first few hours of operation. After the first eight hours of operation, check the belts again and retighten if necessary. Adjust the belt tension so that a firm push with the thumb at a point midway between the longest span deflects the belts approximately 3/4 inch (2 cm). Adjust the belt tension as follows:

a. Loosen the four capscrews (2 on each side of engine) securing the fan bracket to its mounting blocks. Also loosen the four capscrews securing the fan shroud to the radiator.

b. If the belts are too tight, push the fan bracket downward to loosen the belts. If the belts are too loose, use a pry bar (between the stud welded on the inside of mounting bracket and the mounting block) to move the bracket upward.

CAUTION: When adjusting the fan pulley, always adjust the fan shroud the same distance in either direction. The fan must always be centered in the shroud.

c. When the correct adjustment is obtained, tighten the four fan bracket capscrews securely. Tighten the four fan shroud capscrews.

CAUTION: Before starting the engine, make sure that fan blade tips do not contact the shroud.

NOTE: Replace the two drive belts as a matched set when one is worn. Single belts of similar size shout De uses as a substitute for a matched belt set. Premature belt wear can result because of belt length variations after short periods of operation.

4-56. ENGINE LUBRICATION SYSTEM.

4-57. ENGINE OIL (see figure 4-20).

4-58. Engine lubrication oil should be kept up to the FULL mark on the dipstick. To accurately check the oil level, stop the engine and allow approximately five minutes for the oil to drain off of engine internal parts. This eliminates the possibility of overfilling. The oil should generally be changed every 100 hours or two weeks, or more often where adverse

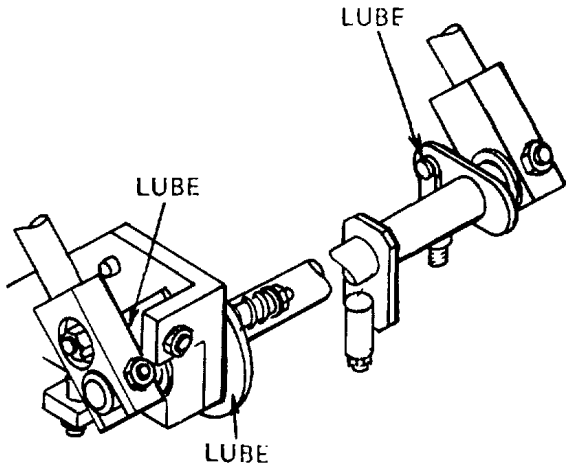


FIGURE 4-21. LUBRICATING THROTTLE AND TRANSMISSION LINKAGE.

conditions prevail. Color cannot be relied upon as indicating the need for an oil change. The use of an oil analysis service is the only reason for not following the change interval specified in Table 4-1. When checking the oil level, make sure that the area around the dipstick and filler cap are clean before removing them.

4-59. ENGINE OIL FILTER (see figure 4-20).

4-60.

The Detroit Diesel oil filter should be changed each time the oil is changed. Clean the outside of the filter flange to prevent dirt from entering the engine. Be sure that a new HYSTER-APPROVED filter and gasket are installed.

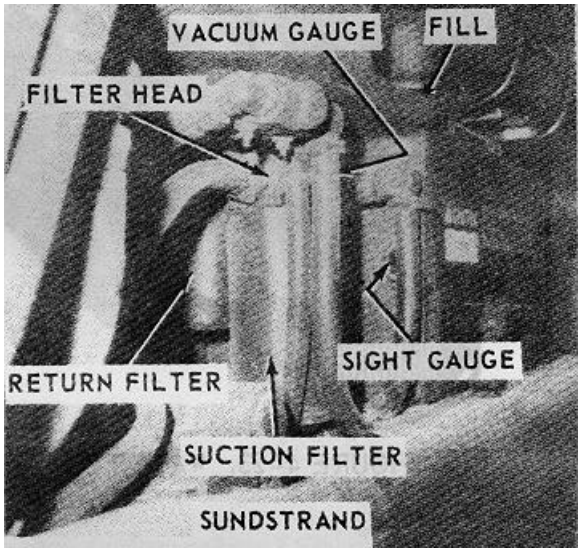


FIGURE 4-22. SERVICING THE HYDRAULIC SYSTEM.

4-61. LUBRICATION THROTTLE AND TRANSMISSION LINKAGE (see figure 4-21).

4-62. Place a few drops of engine oil on the detent plate and crank arm connections every 100 hours of operation or at two week intervals.

4-63. HYDRAULIC SYSTEM (see figure 4-22).

NOTE: The steering system and the hydrostatic transmission system share a common reservoir (located under the right hand operators seat).

4-64. FILLING THE TANK.

4-65. Check the oil level when the hydraulic system is cold and with the steering cylinder fully extended. The oil in the hydraulic tank should be visible through the sight gauge or slightly above gauge level when the oil is cold. Add oil when no longer visible in the sight gauge until oil fills the sight gauge window.

CAUTION: Do not completely fill the tank with oil. Air space is designed into the tank for expansion at warm temperatures. Pressurization will occur in the tank at operating temperature. No attempt should be made to vent the hydraulic system.

4-66. CHANGING THE HYDRAULIC OIL.

4-67. After each 1,000 hours of operation or yearly (whichever occurs first), the hydraulic oil should be drained from the tank and replaced with new oil. This removes dirt, water and mechanical wear particles that have accumulated in the tank. Also, the chemical structure of the oil deteriorates after prolonged use.

4-68. Drain the oil by removing the drain plug at the bottom of the tank. Fill the tank through the filler neck shown in figure 4-22.

CAUTION: Make absolutely sure that the oil level can be seen in the sight guage before starting the engine and operating the steering or hydrostatic transmission systems.

4-69. TRANSMISSION HYDRAULIC FILTERS.

4-70. The suction filter should be checked every 100 hours of operation or at two week intervals by noting the reading on the vacuum gauge. Change the filter element if the reading exceeds 9 inches of mercury with oil temperature at 100°F and engine at high idle. Always replace the suction filter element at least once a year or 1,000 hours, whichever occurs first.

NOTE: Removal of hydraulic lines or hoses is not required for replacement of the element in the suction filter assembly.

a. Unscrew the bowl center post fitting at the bottom of the bowl.

b. Remove and discard the element. Inspect filter head o-ring and bowl gasket. Replace if necessary.

c. Wipe the bottom section of the filter head using a clean, lint-free cloth. Install a new o-ring in the filter head if required. Use a light film of grease to hold the o-ring in place if necessary.

CAUTION: Do not use lint-type cloth to clean hydraulic components. Lint deposits can affect the operation of the system.

d. Install a new element in the filter bowl.

CAUTION: Use only HYSTER-APPROVED filter elements.

e. Screw the assembled filter bowl into the filter head. When tightening the center post, hold the bowl from turning because it may stretch the o-ring out of shape and cause suction leakage. Tighten the center post to a maximum of 20 ft.-lbs.(2.8 kg-m).

4-71. The throw-a-way return filter should be replaced at 1,000 hours of operation or every year, whichever occurs first. Always change the return filter if the suction filter is replaced.

a. Unscrew the filter from the filter head and discard the filter.

b. Wipe bottom of the filter using a clean, lint-free cloth.

CAUTION: Use only HYSTER-APPROVED filters.

c. Apply a film of oil or grease to the new filter gasket (integral with filter).

d. Hand turn the filter into the filter head until the gasket just makes contact. Then tighten one-quarter turn only.

4-74. WATER SPRAY SYSTEM.

4-75. FILTERS (see figure 4-23).

4-76. The non-corrosive sump filter normally requires no maintenance because of the self cleaning action of the water washing back and forth in the tank. If excessive foreign material accumulates in the tank, the filter and the tank will need cleaning. The filter can be inspected by removing the tank access plate.

4-77. The tank inlet screen filter should be periodically cleaned when the water does not readily pass through. The screen lifts out of the tank freely after snap ring is removed.

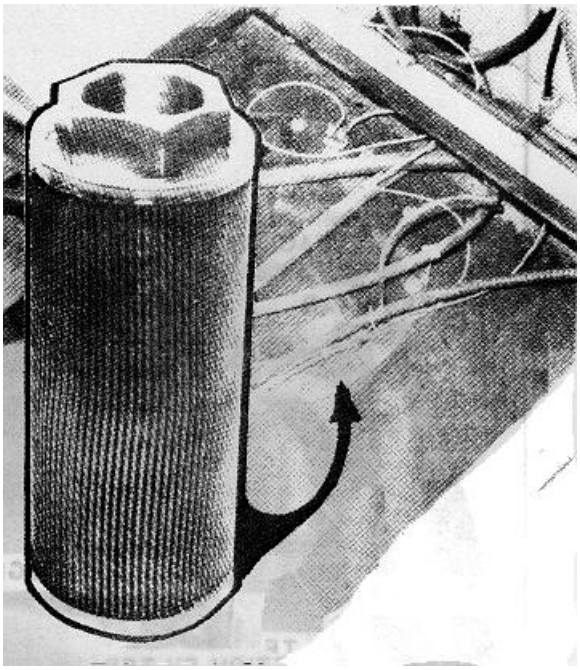


FIGURE 4-23. WATER FILTER

4-78. MANIFOLD AND NOZZLES (see figure 4-24).

4-79. The nozzles are mounted so they receive water from the center of the manifold tube where corrosion and sediment are minimized. This eliminates most of the nozzle plugging problems. Periodically the end caps on the water spray manifold should be removed and the sediment blown from the manifold.

4-80. STORAGE.

4-81. Drain the entire water spray system to

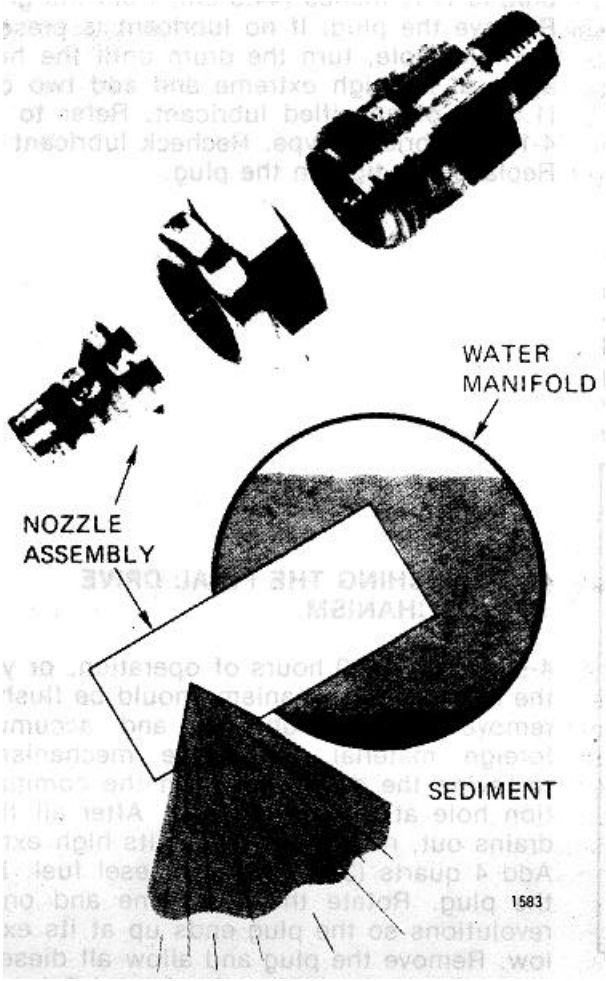


FIGURE 4-24. CLEANING MANIFOLD AND NOZZLES.

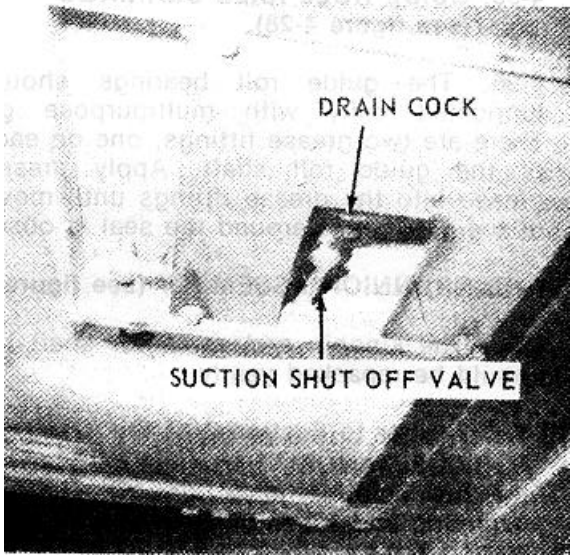


FIGURE 4-25. PUMP DRAIN COCKS,

prevent freezing of water and the resulting damage to components. A drain hole is provided in the tank bottom left corner to drain the tank. Be sure to open the pump drain cock (see figure 4-25). The suction shutoff valve should be open when draining the pump so all the water from the suction side is removed. Water in the pressure side of the system should be blown out with compressed air.

4-82. PARKING BRAKE (see figure 4-26).

4-83. LUBRICATION.

4-84. The parking brake lever assembly should be lubed after each 100 hours of operation or every two weeks. This will prevent the adjusting threads from rusting.

4-85. ADJUSTING.

4-86. The parking brake lever should be adjusted sufficiently to require at least 80 pounds (36.3 kg) to pull it into the brake applied position. Twist the end of the brake lever clockwise (lever in brake off position) to increase force required to apply the brake.

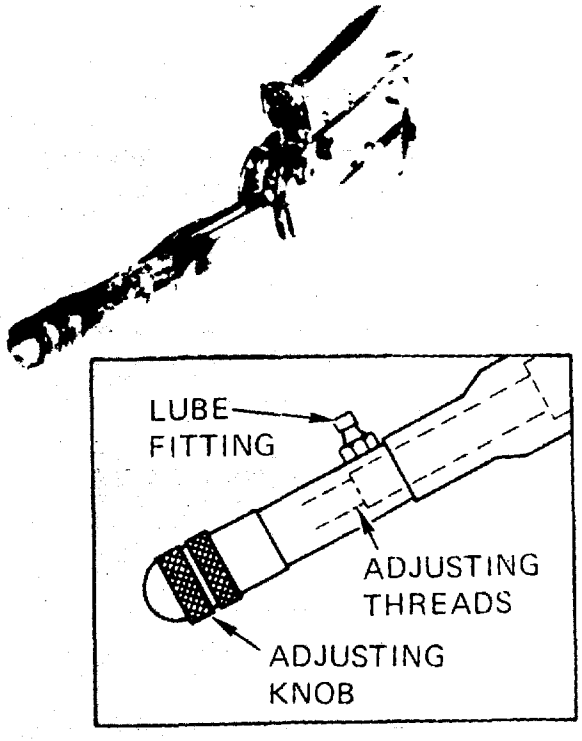


FIGURE 4-26. PARKING BRAKE LEVER MAINTENANCE.

4-87. FINAL DRIVE ASSEMBLY (see figure 4-27).

4-88. CHECKING LUBRICANT LEVEL.

4-89. Model C350B has a fill-and-check plug as described in paragraph 4-90.

4-90. On model C350B, the small pipe plug located on the left-hand side of the drive drum communicates with the final drive compartment. The correct lubricant level of the final drive compartment can be checked by rotating the plug to its high extreme. Then slowly rotate the drive drum until the bottom of the plug is 171/2 inches (44.5 cm) from the ground. Remove the plug. If no lubricant is present at the filler hole, turn the drum until the hole is again at its high extreme and add two quarts (1.9 ltr) of specified lubricant. Refer to Table 4-1 for lubricant type. Recheck lubricant level. Replace and tighten the plug.

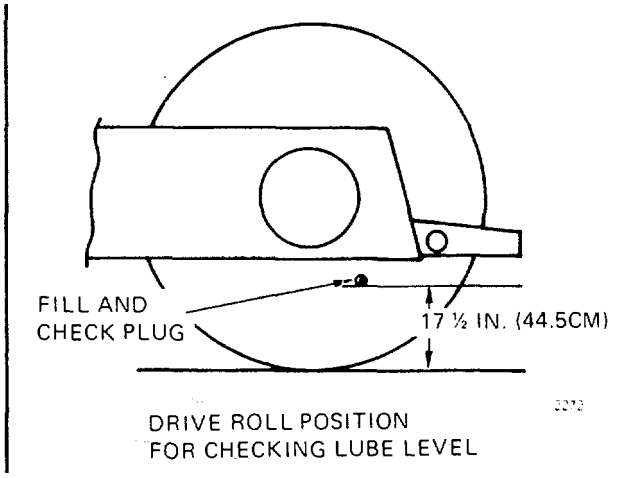


FIGURE 4-27. SERVICING C350B FINAL DRIVE ASSEMBLY.

4-92. FLUSHING THE FINAL DRIVE MECHANISM.

4-93. Each 1,000 hours of operation, or yearly, the final drive mechanism should be flushed to remove the old lubricant and accumulated foreign material. Drain the mechanism by removing the drain plug with the communication hole at its extreme low. After all the oil drains out, rotate the hole to its high extreme. Add 4 quarts (3.8 liters) of diesel fuel. Install the plug. Rotate the drum one and one-half revolutions so the plug ends up at its extreme low. Remove the plug and allow all diesel fuel to drain prior to filling with fresh lubricant.

4-94. STEERING.

4-95. GUIDE ROLL AXLE BEARINGS (see figure 4-28).

4-96. The guide roll bearings should be lubricated daily with multipurpose grease. There are two grease fittings, one on each end of the guide roll shaft. Apply pressurized grease into the grease fittings until movement of the old grease around the seal is observed.

4-97. TRUNNION ASSEMBLY (see figure 4-29).

4-98. The kingpin and oscillator shaft bearing should be repacked yearly.

NOTE: Refer to Section 9 of the C350B SERVICE MANUAL, part number 599661, for the detailed procedure for disassembling and assembling trunnion components.

a. Remove the trunnion assembly from the main frame.

b. Remove oscillator shaft assembly.

c. Clean, inspect, and re-pack kingpin and oscillator shaft bearings.

d. Install oscillator shaft bearings and new seals. Torque bearing retainer nut to specifications listed in Section 2.

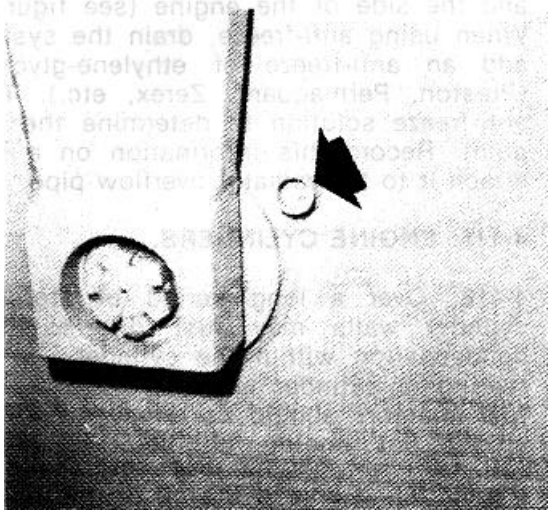


FIGURE 4-28. LUBRICATING GUIDE ROLL AXLE BEARINGS.

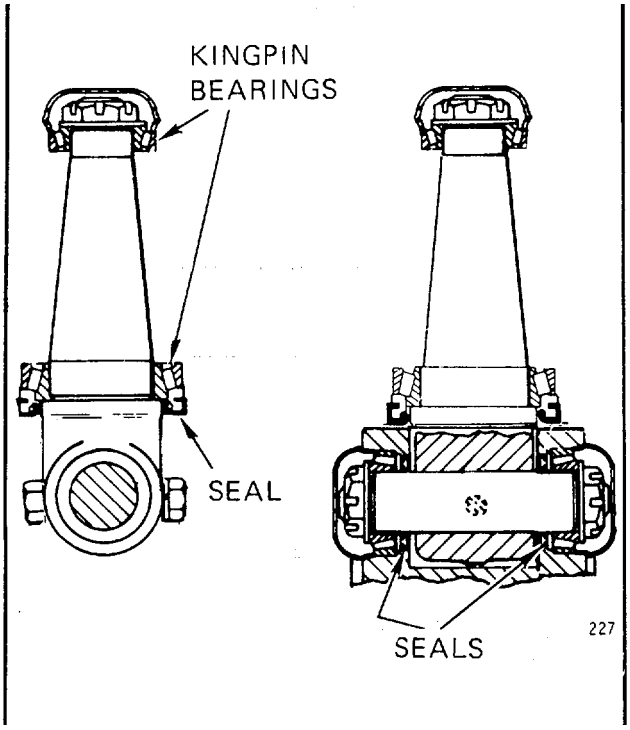


FIGURE 4-29. TRUNNION ASSEMBLY.

CAUTION: Use only HYSTER-APPROVED parts.

e. Install kingpin bearings and lower seal.

f. Install trunnion assembly into, the frame and torque bearing retainer nut to the specification listed in Section 2.

4-99. STEERING CYLINDER BALL JOINTS (see figure 4-30).

4-100. The steering ball joints should be re-packed yearly.

a. Remove rubber dust covers.

b. Disassemble the ball joint on each end of the cylinder.

c. Clean and inspect components.

d. Pack each ball joint assembly with multi-purpose grease.

e. Reassemble the ball joints and adjust so there is no end play.

f. Install rubber dust covers.

CAUTION: Damaged dust covers will not keep out contaminants. Replace with HY- STER-APPROVED parts if original dust covers are damaged.

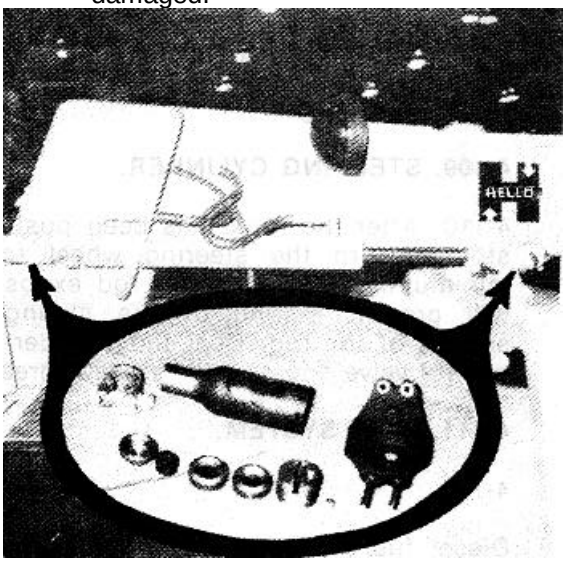


FIGURE 4-30. STEERING CYLINDER BALL JOINTS.

4-101. REMOVING AND REPLACING STEEL BALLAST (see figure 4 -31).

4 -102. The steel ballast can be removed to provide access to the lower engine compartment.

WARNING: Always support ballast securely when removing or installing capscrews.

4-103. UNIT STORAGE.

4-104. To prevent deterioration of components the following precautions should be taken when storing the roller for any length of time.

4 -105. WATER SPRAY SYSTEM.

4-106. Drain the entire water spray system to prevent freezing of water and the resulting damage to components. A drain hole is provided in the tank bottom left corner to drain the tank. Be sure to open the pump drain cock (see figure 4 -25). The suction shut -off valve should be open when draining the pump so all water from the suction side is removed. Water in the pressure side of the system should be blown out with compressed air. Cap or tape the nozzles and coat the tank fill cap threads with grease.

4-107. DRUM BALIAST.

4-108. If water ballast is being used in the guide rolls and drive drum, this water should be drained before storing. Rotate each drum until the ballast plug (largest plug) is at its low extreme when draining. Replace the drain plugs for storage.

4-109. STEERING CYLINDER.

4-110. After the roller has been positioned for storage, turn the steering wheel to provide minimum steering cylinder rod exposure. This will prevent rusting of the sliding contact surface of the rod. Coat the cylinder rods and control valve spools with a heavy grease.

4-111. FUEL SYSTEM.

4-112.

Diesel fuel will leave a waxy substance that plugs the system. If the unit is placed in storage for any appreciable length of time, all fuel should be drained from the tank and the engine run until the fuel in the system is used.

4-113. ENGINE COOLING SYSTEM

4-114. When storing the unit, the engine cooling system should be protected against freezing. This can be done by either draining the system or adding one of the various anti -freeze mixtures. To drain the system, open the stop cocks on the bottom of the radiator and the side of the engine (see figure 4 -16). When using anti -freeze, drain the system and add an anti -freeze of ethylene -glycol base (Preston. Permaguard, Zerex, etc.). Test the anti -freeze solution to determine the freezing point. Record this information on a tag and attach it to the radiator overflow pipe.

4-115. ENGINE CYLINDERS.

4-116. Over a long period of storage, the cylinder walls may rust due to moisture condensation within the cylinder. To prevent rusting of cylinder walls, the or fuel injectors should be removed and a small amount of engine oil squirted into each cylinder. Turn the engine over several times with the starter to spread the oil on the entire cylinder wall. Replace the or fuel injectors. Repeat this procedure prior to starting after storage.

4-117. BATTERY.

4-118. A fully charged battery will maintain itself for a long period of time if kept cool and disconnected. The electrolyte in the battery should be checked periodically to insure a proper level. If it is low, add clean drinking water until proper level is obtained. Check the electrolyte specific gravity periodically and recharge the battery as necessary. This is especially important if freezing temperatures are expected. Clean and dry the battery, especially the terminals. Coat the terminals with HYSTER -APPROVED battery terminal coating to prevent corrosion.

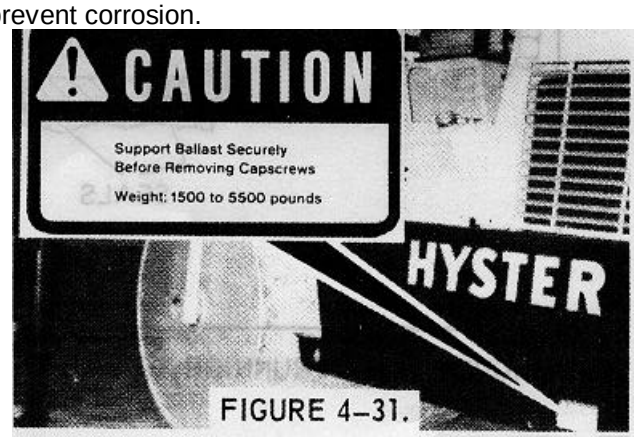


FIGURE 4–31.

5-1. GENERAL.

5-2. Tables 5-1 through 5-5 are trouble analysis check charts for the individual systems of the compactor.

TABLE 5-1. TROUBLE ANALYSIS FOR WATER SPRAY SYSTEM.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Spray Motor Will Not Operate.	Toggle switch open.	Replace switch.
	Circuit breaker not re-setting.	Replace breaker.
	Motor brushes worn excessively.	Replace brushes.
Spray Motor Will Not Turn Off.	Toggle switch shorted.	Replace switch.
Pump Operates But There Is Little Or No Spray Pattern.	Insufficient liquid in reservoir.	Replenish liquid supply.
	Water filter plugged.	Clean water filter and tank.
	Spray nozzles plugged.	Clean nozzles and nozzle manifold.
	Pump housing cracked from freezing.	Replace pump.
Spray Pattern Not Completely Covering The Drum (s).	Spray angle incorrect.	Adjust nozzle manifold so spray pattern completely covers drum. Refer to the water spray section.
	One or more nozzles plugged.	Clean nozzle(s).
	Charging system malfunctioning (low voltage to motor).	Check charging system.

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TABLE 5-2B. TROUBLE ANALYSIS FOR SUNDSTRAND HYDROSTATIC TRANSMISSION.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Unit Will Not Operate In Either Direction.	Transmission by–pass valve open.	Close valve. Refer to Section 3.
	System low on oil.	Check oil level at sight gauge on side of unit. Replenish with approved oil listed in Section 4. Locate and repair leaks causing loss of oil.*
	Faulty control linkage to pump.	Check the linkage from control levers to pump arm to make sure it is connected and free to operate. Refer to Section 7 for adjustment procedure.
	Faulty control linkage inside pump.	Refer to Section 7 for pressure check procedure.
	Low or zero charge pressure.	Refer to Section 7 for pressure check procedure.
	a. Charge pressure relief valves in charge pump or motor manifold damaged or stuck open.	Refer to Section 7 for replacement of charge pressure relief valve.
	b. Suction filter or hose from tank to charge pump clogged.	Service filter, flush suction line from tank to charge pump. Refer to Section 3.
	c. Charge pump drive shaft sheared.	Replace the charge pump.
	d. Internal damage to pump or motor.	Refer to Probable Cause "Internal damage to pump and motor."
	e. Cold or improper oil.	Refer to Section 4 for approved oil.

*Refer to manufacturer's warranty policy.

TABLE 5-2B. TROUBLE ANALYSIS FOR SUNDSTRAND HYDROSTATIC TRANSMISSION (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Unit Will Not Operate In Either Direction (Cont.)	Low and fluctuating charge pressure.	Refer to Section 7 for proper pressure check procedure.
	a. Air in system.	Check all fittings, especially around filter, in the suction line and locate point or points where air is being drawn into the system. Tighten fittings where air leaks exist.
	b. Charge pressure relief valve in the motor manifold stuck open.	Free–up or replace charge pressure relief valve. Refer to Section 7 for replacement procedure.
	c. Internal damage to pump or motor.	Replace with new or overhauled pump and motor. Refer to Section 7.
	Defective charge check valves.	Check operation in both directions to determine which check valve is defective.
	Defective high pressure relief valves at motor manifold.	Refer to Section 7 for pressure check procedures. Examine both relief valves. Clean and replace if defective. Do not attempt to shim valves.
	Internal damage to pump or motor. Indicated by: a. Low, zero or rapidly fluctuating charge pressure. b. Operating pressure in forward or reverse is less than high pressure relief setting. Charge pressure lower than normal, may drop to zero when high pressure is reached. c. Noisy pump or motor.	**NOTE:** Indications a, b and c may be corrected by minor repair procedures. Refer to Section 7 for hydrostatic system checks and adjustments before removing pump or motor. If internal failure is certain, replace with a new or overhauled pump or motor.*
	d. Pieces or flakes of brass in tank or filters.	d. Replace pump or motor with a new or overhauled pump or motor.* **NOTE:** If either unit is considerably worn or damaged, carefully check and clean the other unit (pump or motor). Refer to Section 7 for system start–up procedures.
Unit Operates In One Direction Only.	Faulty control linkage to pump.	Check the linkage from control levers to pump arm to make sure it is connected and free to operate. Refer to Section 7 for adjustment procedures.

*Refer to manufacturer's warranty policy.

TABLE 5-2B. TROUBLE ANALYSIS FOR SUNDSTRAND HYDROSTATIC TRANSMISSION (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Unit Operates In One Direction Only (Cont.)	Faulty high pressure relief valve.	Refer to Section 7 for pressure check procedures.
	Charge check valve faulty.	Replace and check pressure.*
	Defective control valve.	Replace and check pressure.*
Neutral Difficult Or Impossible To Find.	Faulty controls or linkage to pump.	Refer to Section 7 for adjustment procedures.
	Oil level low.	Check oil level at sight gauge on tank. Replenish tank with approved oil listed in Section 4.
System Operating Hot.	Oil cooler clogged.	Clean oil cooler air passages.
	Oil cooler being bypassed.	Inspect cooler bypass valve. Clean or replace. Arrow on valve should point up in the line to the return manifold.
	Clogged filters or suction line.	Service suction or return filters. Clean or replace line from tank to charge pump.
	Internal leakage (usually accompanied by loss of acceleration and power). a. High pressure relief valves stuck partially open.	Refer to Section 7 for pressure check procedures. If the operating pressure is 200 PSI (14 kg/cm^2) or more, lower in in one direction, switch the high pressure valves. If the lower pressure reading switches to the opposite side of the circuit, do not attempt to shim valve. Replace the valve.
System Operating Hot. (Cont.)	b. Internal parts of pump or motor (or both) worn.	Refer to Section 7 for pressure check procedures. Replace defective pump or motor. **NOTE:** If either unit is considerably worn or damaged, carefully check and clean other unit (pump or motor).
System Noisy.	Air in system. a. Low oil level.	Check oil level at sight gauge on side of tank. Replenish with approved oil listed in Section 4. Locate and fix leaks causing loss of oil.

*Refer to manufacturer's warranty policy.

TABLE 5-2B. TROUBLE ANALYSIS FOR SUNDSTRAND HYDROSTATIC TRANSMISSION (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
System Noisy (Cont.)	b. Line or filter leaks (considerable amount of foam in the tank).	Check suction filter and suction line between tank and charge pumps for leaks allowing air to enter into system. Replace defective hose and/or tighten fitting.
	Hosing or tubing not properly insulated.	Make sure hose or tubing is not touching any metal that can amplify natural hydraulic system hum.
Acceleration and Deceleration Sluggish.	Air in system.	Refer to "System Noisy" air in system.
	Low charge pressure.	Refer to "System Will Not Operate In Either Direction." Low or zero charge pressure.
	Control orifice plug partially blocked.	Refer to Section 4. Replace suction filter more often.
	Internal wear or damage.	Refer to "Unit Will Not Operate In Either Direction." Internal damage to pump or motor.
	Engine lugs down.	Refer to engine manufacturer's service manual.

*Refer to manufacturer's warranty policy.

TABLE 5-3. TROUBLE ALALYSIS FOR FINAL DRIVE ASSEMBLY.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Unit Will Not Move.	Control linkage to transmission.	Adjust. Refer to Section 7.
	Transmission bypass valve open.	Close valve control. Refer to Section 3.
	Broken drive shaft.	Replace defective part. Determine cause of failure and correct before placing unit back in service. Check entire drive train for possible damage.
	Planetary gears jammed.	Remove final drive from unit for complete teardown and inspection. Check all parts for damage. Replace as needed. Check alignment of components. Refer to Section 8.
	Parking brake not releasing.	Inspect for jammed linkage or material jammed against brake drum.

TABLE 5-3. TROUBLE ANALYSIS FOR FINAL DRIVE ASSEMBLY (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Noisy Final Drive.	Dry or defective bearings.	Remove final drive assembly from axle housing. Disassemble as needed to check for damaged parts. Replace as needed (refer to Section 8). Assemble and fill with proper lubricqnt (refer to Section 4).
	Incorrect bearing adjustment.	Adjust the motor carrier bearing preload. Refer to Section 8.
	Worn or broken planetary gear teeth.	Replace parts as needed. Check for use of proper lubricant (refer to Section 4). Install gears as specified in Section 8.
	Incorrect or lack of lubricant.	Fill with correct lubricant as specified in Section 4.
Losing Lubricant.	Worn brake shaft seal.	Replace seal. Lubricate before installation.
	Defective motor housing gasket.	Replace gasket. Fill final drive as specified in Section 4.
	Incorrect lubricant.	Drain lubricant. Refill as specified in Section 4.
	Over–filling.	Drain to correct level. Refer to Section 4 for filling instructions.
	Operating on side slope.	Operate the unit up or down the grade.

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TABLE 5-4. TROUBLE ANALYSIS FOR STEERING SYSTEM (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
GEAR PUMP (Detroit Diesel Only)		
Pumping Not Delivering Fluid.	Drive shaft sheared.	Remove and disassemble the pump. Inspect and replace worn or broken parts.
	Air leaks at the intake.	Check the inlet connections to determine where air is being drawn in. Tighten any loose connections. Replace seals where necessary.
	Fluid intake hose in reservoir restricted.	Remove and flush or replace suction hose between the pump and tank. Service transmission filters if necessary.
	Gears worn or broken.	Replace parts as necessary.
Insufficient Pump Pressure.	Insufficient relief pressure.	Check relief valve in the flow divider for contamination. Clean or replace.
	Worn parts causing internal leakage of pump delivery.	Inspect and replace as necessary.
	Damage to cylinder packing.	Refer to "Steering Cylinder Troubles".
Pump Making Noise.	Pump intake partially blocked.	Remove and flush or replace suction line between pump and tank. Check the fluid condition and, if necessary, drain and flush the system. Refill with clean fluid.
	Air leaks at the intake or shaft seal. (Oil in tank may be foamy.)	Check the inlet connections and seal to determine where air is being drawn in. Tighten any loose connections and replace if necessary.
	Air in circuit.	Check all connections for tightness.
	Dirt and sludge in the pump.	Disassemble the pump and clean all parts. Drain the hydraulic tank and flush. Replace with the proper oil as specified in Section 4. Replace the transmission oil filters.

TABLE 5-4. TROUBLE ANALYSIS FOR STEERING SYSTEM (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
STEERING CONTROL UNIT (Handpump)		
No Response When Steering Wheel Is Turned Slowly.	Dirt in hydraulic system.	Drain and flush complete hydraulic system. Change transmission suction and return filters. Refill system with specified hydraulic fluid. Refer to Section 4.
	Oil level too low.	Fill to sight gauge on tank. Refer to Section 4 for specified hydraulic fluid.
Slow Or Hard Steering.	Oil level low.	Fill to sight gauge on tank. Refer to Section 4 for specified hydraulic fluid.
	Clogged line.	Check lines. Clean and replace as required.
	Dirt in hydraulic system.	Drain and flush complete hydraulic system. Change transmission suction and return filters. Refill system with specified hydraulic fluid. Refer to Section 4.
	Worn sleeve and spool.	Replace sleeve, spool and housing as a unit.
	Worn metering gear.	Replace both sets of metering gears.
	Malfunction of double vane hydraulic pump.	Refer to troubleshooting – Gear Pump.
	Manual steering check bail off its seat.	Replace spring and ball. Check seat.
Steering Wheel Does Not Center.	Broken centering springs.	Replace all springs (6). Refer to Section 9.
Continuous Steering Wheel Rotation.	Broken centering springs.	Replace centering springs (6). Refer to Section 9.
	Burr on sleeve and spool.	Remove burr with 600 grit abrasive paper on a flat surface. Remove sharp edges from abrasive paper to prevent scratches.
	Dirty fluid.	Drain and flush complete hydraulic system. Change suction and return filters. Refill system with specified hydraulic fluid. Refer to Section 4.
No Response.	Pump failure.	Refer to troubleshooting – Gear Pump.

TABLE 5-4. TROUBLE ANALYSIS FOR STEERING SYSTEM (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
STEERING CONTROL UNIT (Handpump) (Cont.)		
No Response (Cont.)	Hoses clogged.	Replace or flush hoses.
Wrong Response To Steering Wheel.	Hose incorrectly installed.	Refer to Section 9 for hose routing.
	Metering star gear to slot in shaft misaligned.	Realign star gear and shaft. Refer to Section 9.
STEERING CYLINDER		
No Motion Of Hydraulic Cylinder.	No oil or insufficient oil being supplied to cylinder.	Check the hydraulic system for: defective pump or pump drive, vacuum or pressure leak in lines, low oil level, low relief setting at pump. Repair defective unit.
Slow Cylinder Motion.	Insufficient oil being supplied to cylinder.	Check hydraulic system as described above.
	Worn cylinder–piston packing.	Replace packing.
Spongy Or Jerky Action.	Air in system.	Check reserve oil level, fill tank as necessary. Check inlet side of pump for vacuum leaks. Tighten connections. Bleed system. Refer to Section 9.
	Sticky relief valve.	Remove and check the relief valve. Repair or replace parts as necessary. If foreign particles are the cause of malfunction, check reserve oil for contamination. Whenever oil is contaminated, it should be replaced and the filter serviced. Make sure sealing surfaces are mating properly.
	Bent or deformed cylinder–piston or rod.	Disassemble, check and repair cylinder assembly.

TABLE 5-5. TROUBLE ANALYSIS FOR BRAKE SYSTEM.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Parking Brake Will Not Apply.	Cable disconnected, clamps loose or linkage binding.	Connect cable or related linkage rods. Tighten clamps. Free–up linkage. Adjust linkage as specified in Section 10.
	Brake lining worn.	Replace.

TABLE 5-5. TROUBLE ANALYSIS FOR BRAKE SYSTEM (CONT.).

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Parking Brake Applies But Will Not Hold.	Maladjusted.	Adjust. Refer to Section 10.
	Grease or oil on lining.	Replace lining. Locate cause of contamination.
	Worn lining.	Replace.
	Cables on linkage seized.	Free-up or replace.
Parking Brake Will Not Release Or Drags.	Adjusted too tightly.	Adjust as specified in Section 10.
	Shoe retracting spring or linkage springs weak, broken or disconnected.	Replace.
	Cable seized.	Free-up or replace.

6-1. GENERAL (see figure 6 -1).

6-2. The electrical system consists of several subsystems, they are: starting circuit, charging circuit and the discharge circuit (gauges, lights, etc.) When checking for default each subsystem should be considered because of their interdependence. The electrical system specifications are given in Section 2, and a troubleshooting guide is presented in Section 5.

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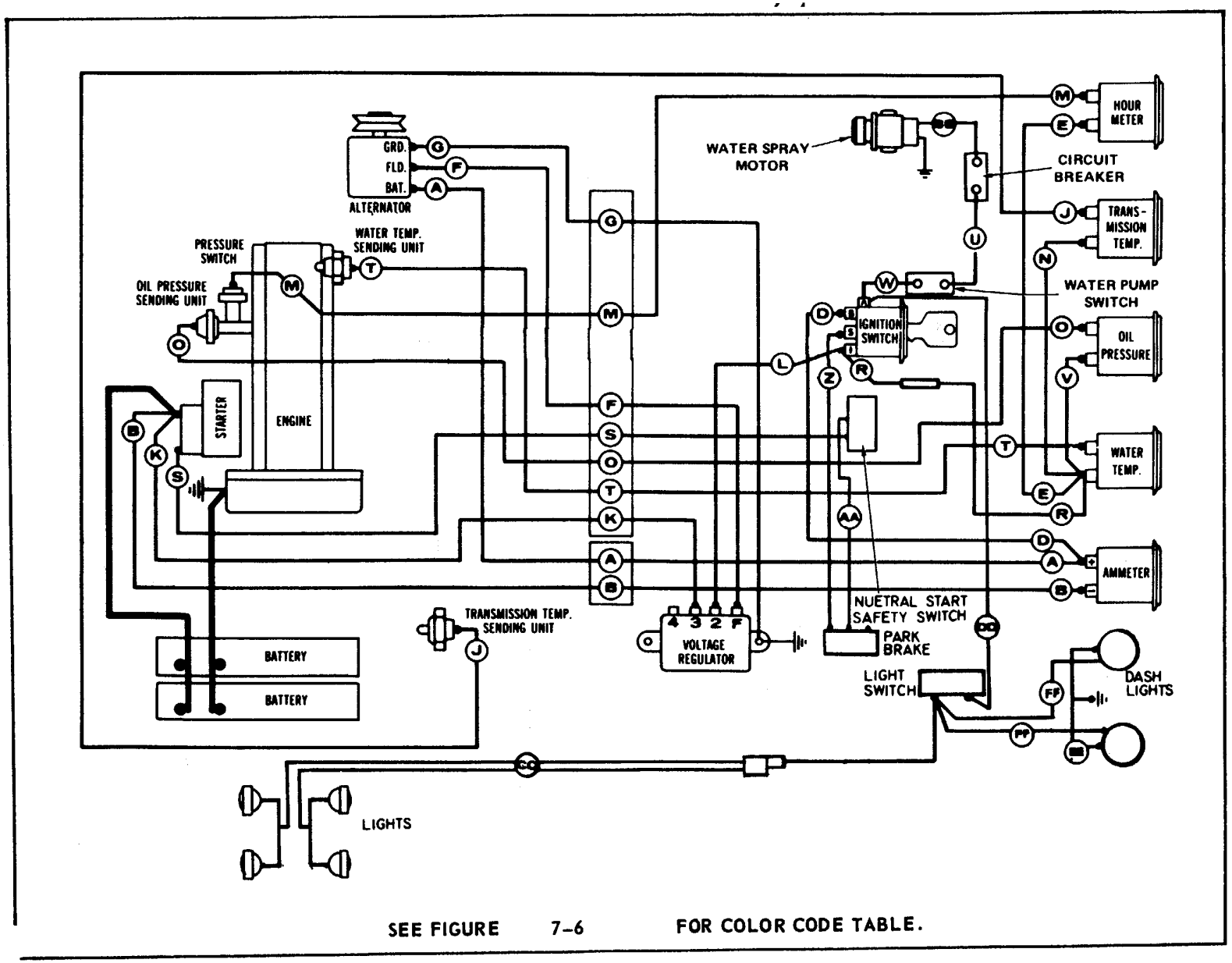
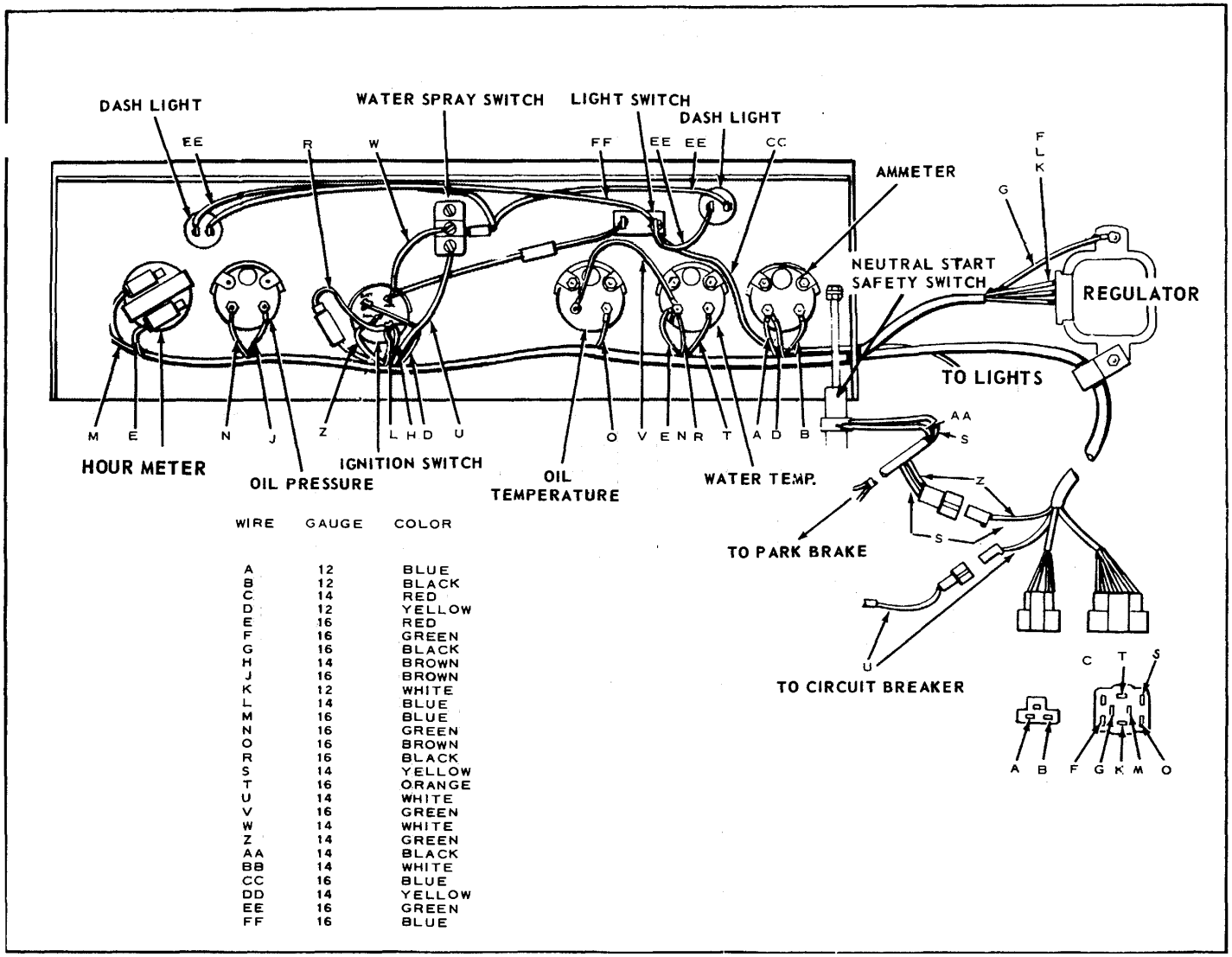
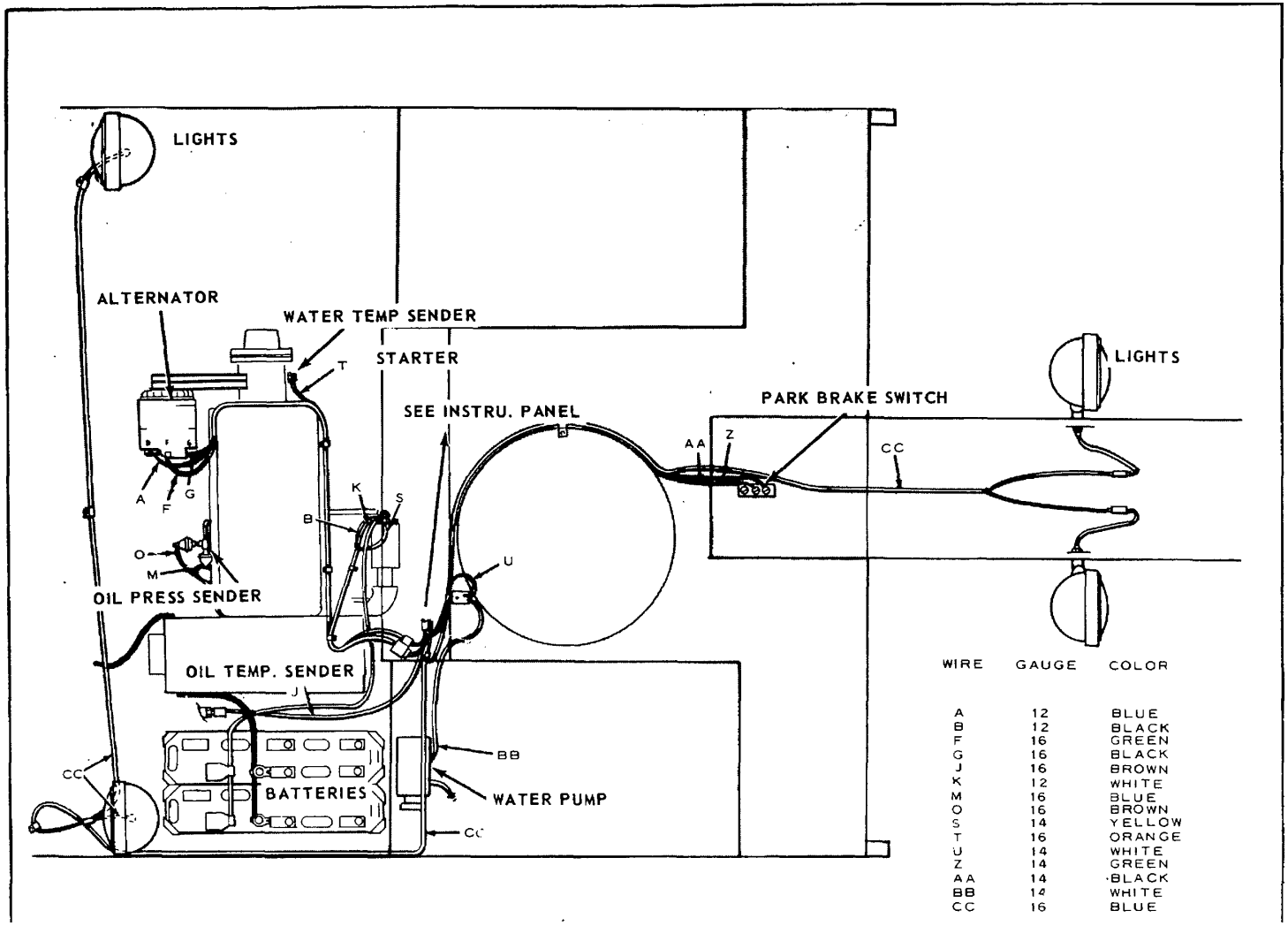


FIGURE 6-4. ELECTRICAL SCHEMATIC FOR DETROIT 6-4.



WIRE	GAUGE	COLOR
A	12	BLUE
B	12	BLACK
C	14	RED
D	12	YELLOW
E	16	RED
F	16	GREEN
G	16	BLACK
H	14	BROWN
J	16	BROWN
K	12	WHITE
L	14	BLUE
M	16	BLUE
N	16	GREEN
O	16	BROWN
R	16	BLACK
S	14	YELLOW
T	16	ORANGE
U	14	WHITE
V	16	GREEN
W	14	WHITE
Z	14	GREEN
AA	14	BLACK
BB	14	WHITE
CC	16	BLUE
DD	14	YELLOW
EE	16	GREEN
FF	16	BLUE

FIGURE 6-5. INSRTUMENT PANEL DETAIL FOR DETROIT ENGINE
6-5.



WIRE	GAUGE	COLOR
A	12	BLUE
B	12	BLACK
F	16	GREEN
G	16	BLACK
J	16	BROWN
K	12	WHITE
M	16	BLUE
O	16	BROWN
S	14	YELLOW
T	16	ORANGE
U	14	WHITE
Z	14	GREEN
AA	14	BLACK
BB	14	WHITE
CC	16	BLUE

FIGURE 6-6. ROUTING DIAGRAM FOR DETROIT DIESEL ENGINE.

SEE FIGURE 6-4 FOR ELECTRICAL SCHEMATIC

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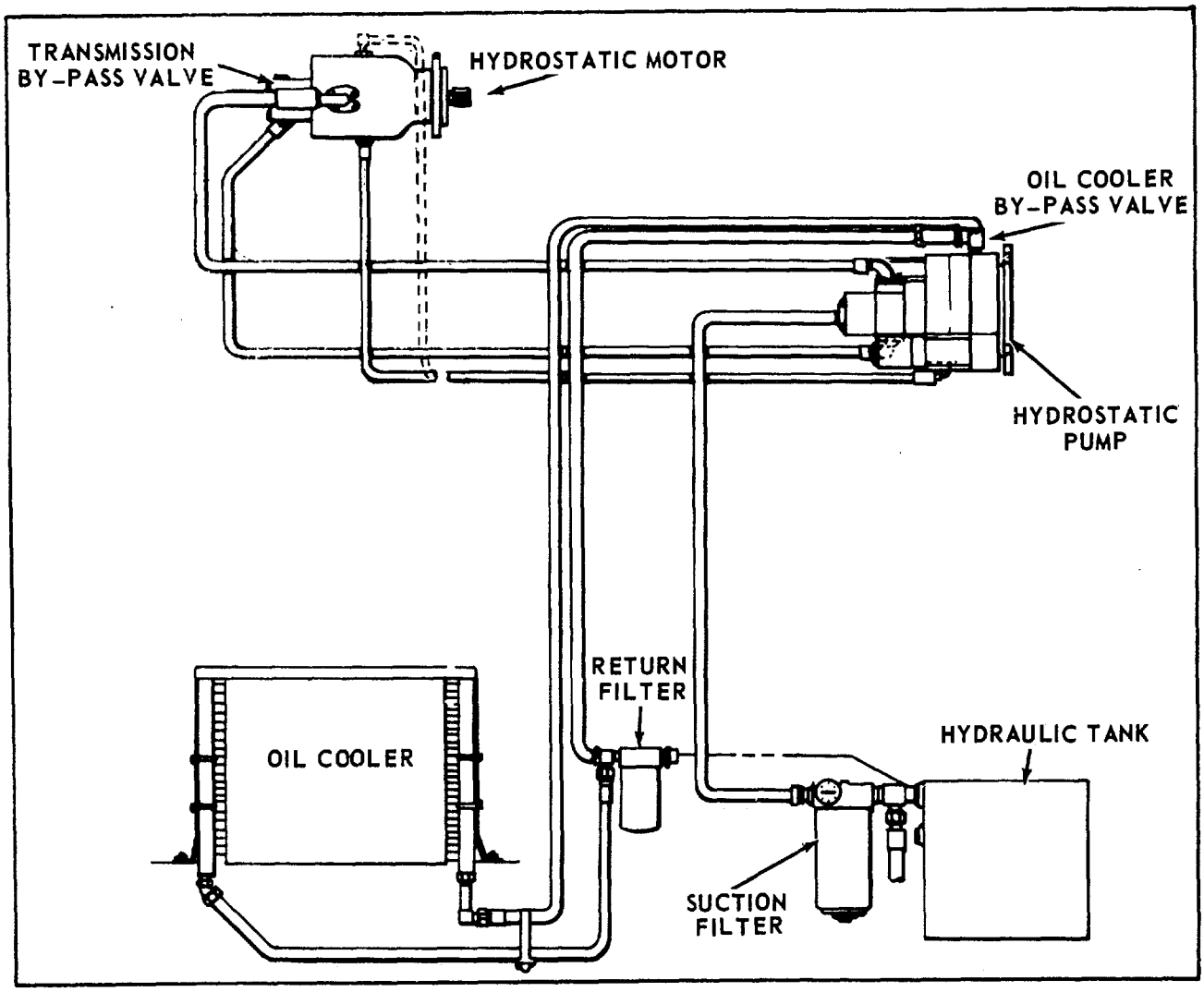
TRANSMISSION
BY-PASS VALVE
HYDROSTATIC MOTOR
OIL COOLER
BY-PASS VALVE
HYDROSTATIC
PUMP
RETURN
FILTER
OIL COOLER
HYDRAULIC TANK
SUCTION
FILTER

FIGURE 7-32

SUNDSTRAND HYDROSTATIC TRANSMISSION

7-85. GENERAL.

7-86. This section contains a description of the Sundstrand hydrostatic transmission, transmission components and their function in their hydraulic circuits. Service instructions are given that include removal of components, disassembly, inspection, reassembly and installation procedures.

7-87. Checks and adjustments are presented in this section. Design and performance specifications are presented in Section 2. The troubleshooting guide is presented in Section 5.

7-88. HYDRAULIC SYSTEM (see figure 7-32).

7-89. The closed loop hydraulic system consists of two subsystems: the hydrostatic transmission subsystem and the steering subsystem. The two subsystems share hydraulic oil and hydraulic tank. These components are presented in this section. Refer to the steering section for the remaining coverage of the steering hydraulic components.

7-90. HYDRAULIC OIL.

7-91. Specifications for hydraulic oil are given in Section 2.

7-92. HYDRAULIC SYSTEM COMPONENTS (see figures 7-33, 7-34 and 7-35).

7-93. GENERAL.

7-94. The hydrostatic transmission offers infinite control of speed and direction. Control of the variable displacement, axial piston pump and the fixed displacement motor is the key to controlling the unit. When the variable pump swash plate is tilted, by movement of the Direction-Throttle Control Bail, a positive stroke to the pistons is created. This, at any given input speed, produces a flow from the pump. This flow is transferred through high-pressure lines to the motor. The ratio of the volume of flow from the pump to the displacement of the motor will determine the speed of the motor output shaft. Movement of the Direction-Throttle Control Bail to the opposite side of neutral causes the flow from the pump to reverse and the motor output shaft turns in opposite direction. Speed of the output shaft is controlled by adjusting the displacement (flow) of the transmission. Load (working pressure) is determined by external conditions such as grade and ground conditions which establish the demand on the system. The pump and motor are contained in separate housings and are connected by high-pressure hoses. All valves required for a closed loop circuit are included in either the pump or motor assemblies. A reservoir, filter, oil cooler and lines complete the circuit. Figure 7-33, 7-34 and 7-35 illustrate the system in neutral, forward and reverse modes.

7-95. CHARGE PUMP CIRCUIT.

7-96. CHARGE PUMP.

7-97. A charge pump is a part of the hydrostatic pump assembly. When the engine is running, the charge pump provides oil supply, cooling and pressure for control functions.

7-98. The charge pump draws oil from the hydraulic tank, through the suction filter to supply oil, under pressure, to the low-pressure side of the main circuit.

7-99. NEUTRAL CHARGE PRESSURE RELIEF VALVE.

7-100. When the transmission is in neutral, charge pump pressure is controlled by the neutral charge pressure relief valve. This valve is an integral part of the charge pump and has no adjustments that can be made in the field. When charge pressure exceeds the range of 190 to 220 PSI (13.36-15.47 kg/cm2) above case pressure, the neutral charge pressure relief valve opens allowing oil to flow into the pump case, oil cooler and hydraulic tank.

7-101. SUCTION FILTER.

7-102. A low-pressure filter is mounted on the hydraulic tank. It serves as the suction filter for the transmission inlet oil. It is a 10 micron filter. There is **no** by-pass valve on the suction filter.

7-103. COOLING CIRCUIT.

7-104. The cooling circuit maintains a flow of oil through the transmission for cooling purposes. Excess oil from the low-charge- pressure relief valve enters the motor housing. Flow is then directed through drain lines to the pump housing. The circuit is completed from the pump housing through the oil cooler to the oil tank. When the hydrostatic pump is in

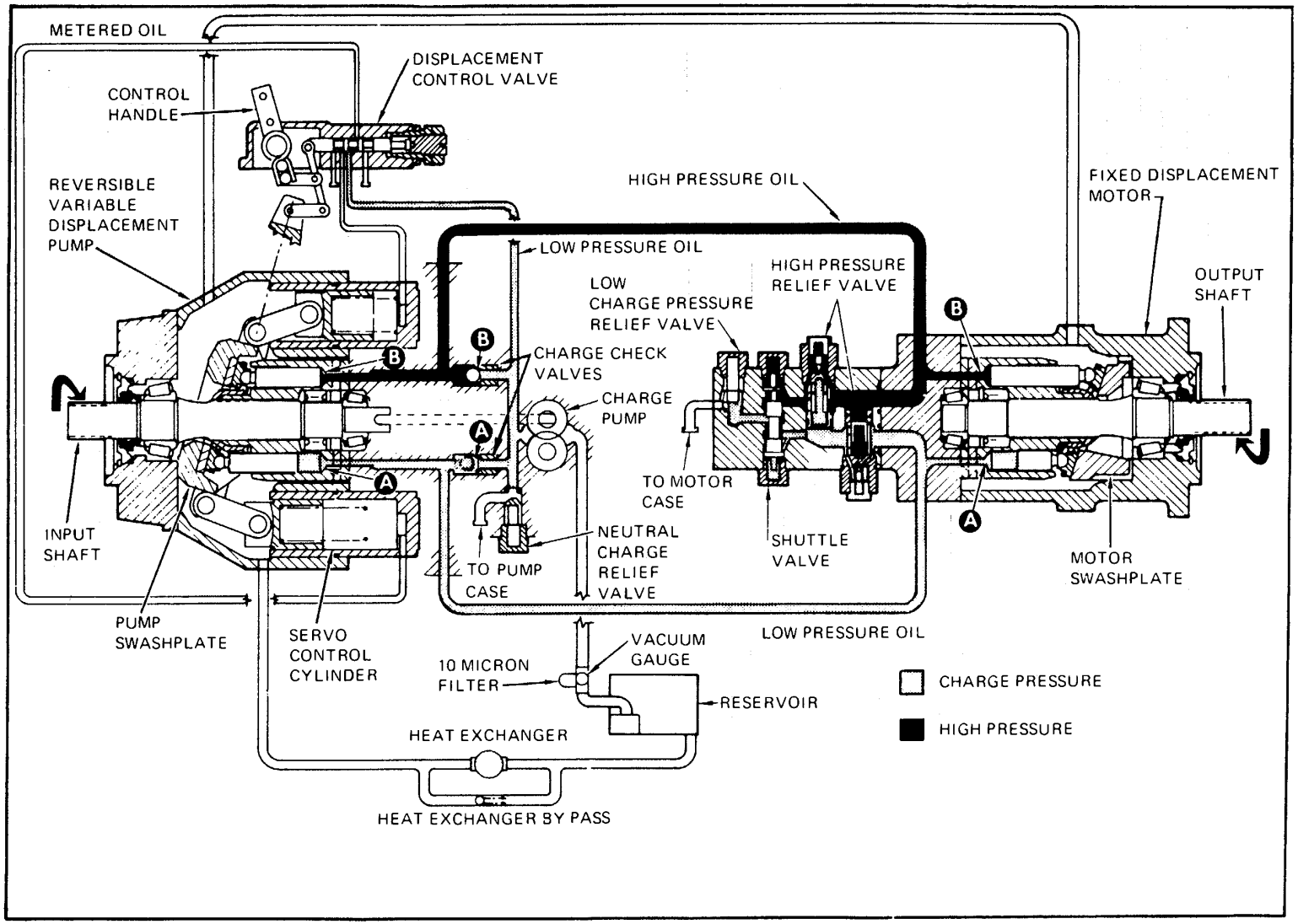

FIGURE 7-33. SUNSTRAND TRANSMISSION IN FORWARD.

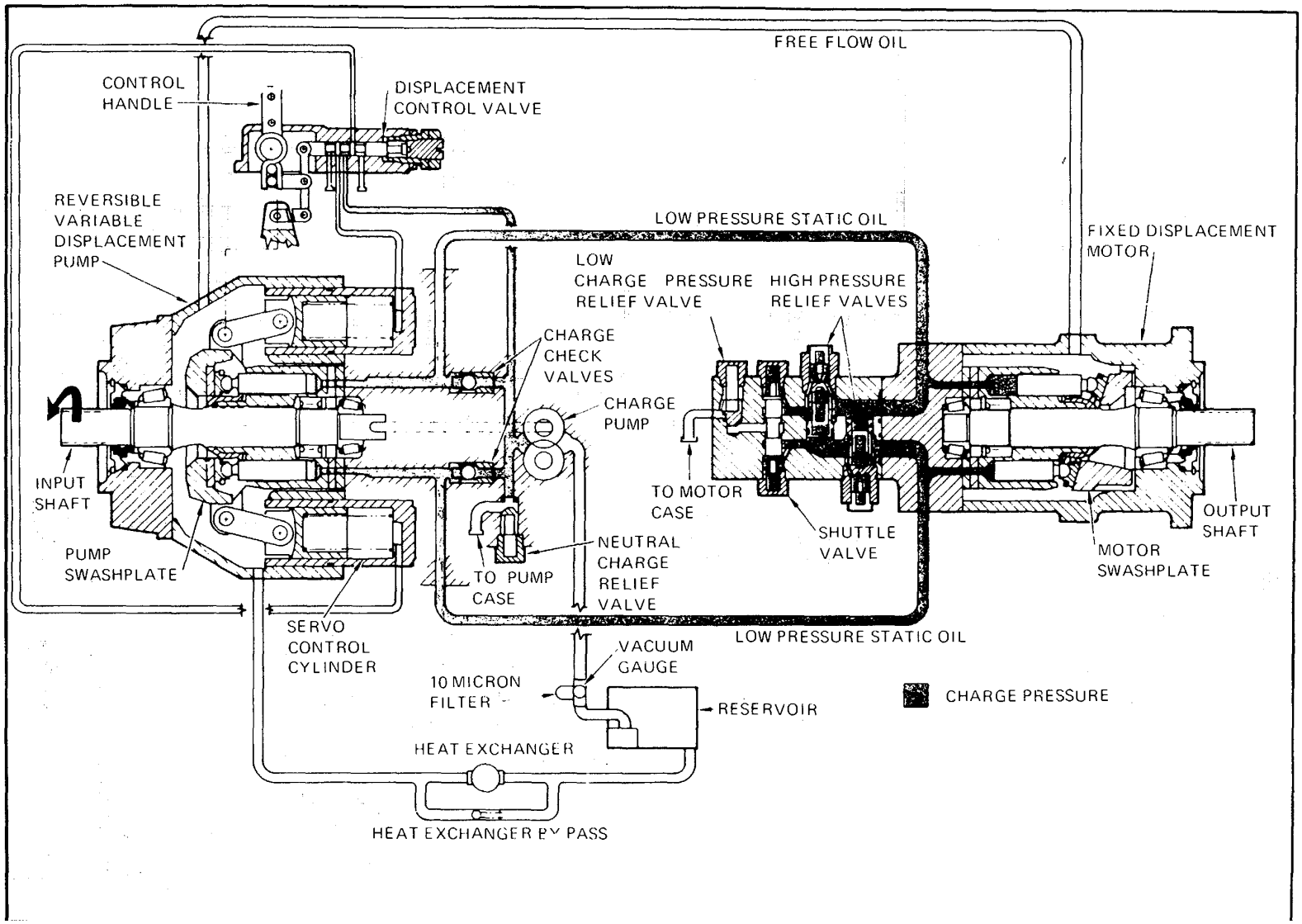

FIGURE 7-34. SUNSTRAND TRANSMISSION IN NEUTRAL

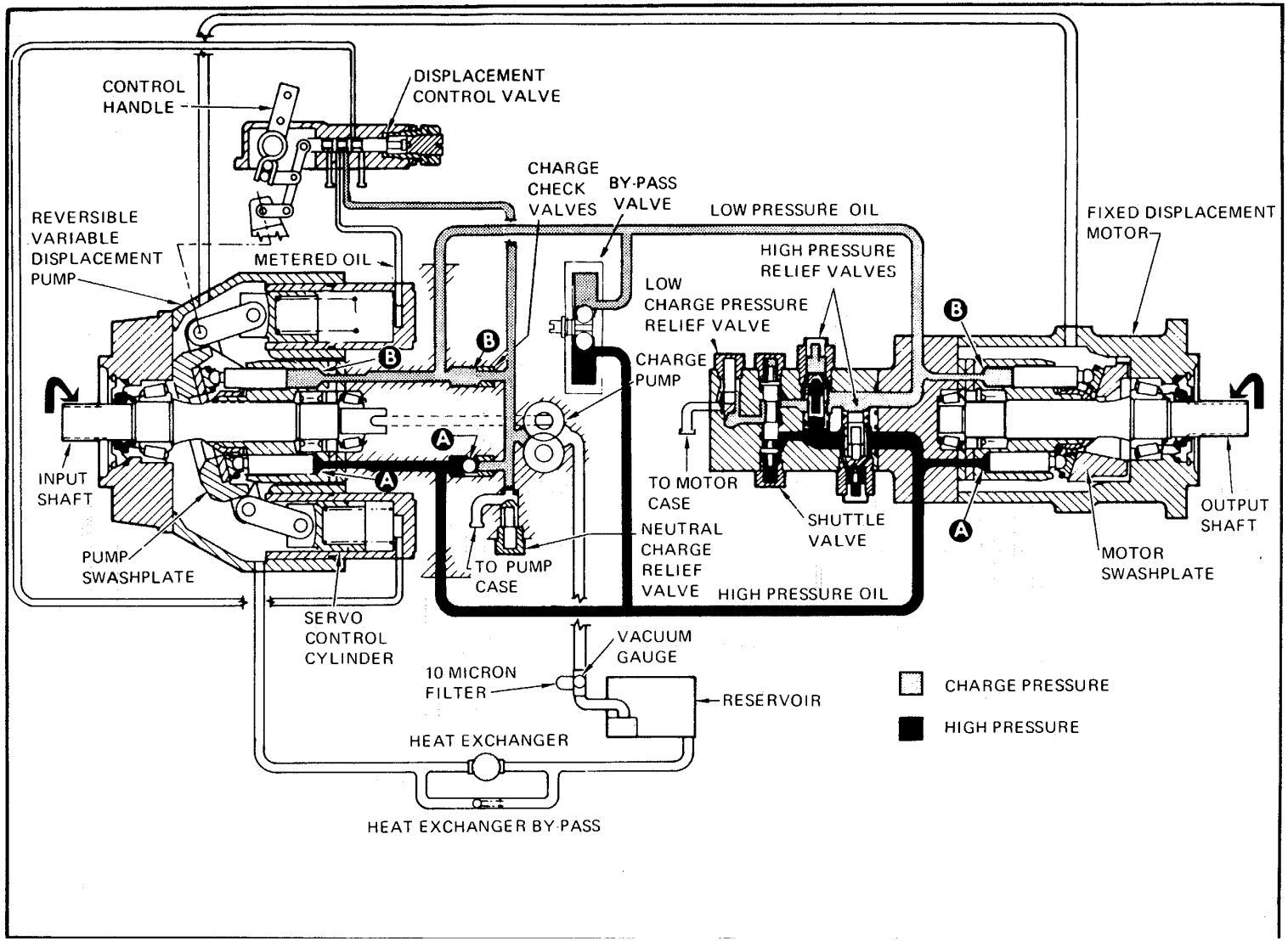

FIGURE 7-35. SUNSTRAND TRANSMISSION IN REVERSE.

neutral, the shuttle valve (located in the hydrostatic motor manifold) is centered allowing oil from the charge pump to be directed to the cooling circuit by the low-charge-pressure relief valve. Cooling circuit flow in neutral is not admitted to the motor, but is directed to the pumps' drain circuit, through the oil cooler to the hydraulic tank.

7-105. OIL COOLER.
7-106. The oil cooler is mounted with the engine radiator. It is connected between the motor case drain port and the hydraulic tank. Excess cooing oil from the low-charge- pressure relief valve enters the motor case, then flows through the case drain line through the pump case to the oil cooler and the tank.

7-107. OIL COOLER BYPASS VALVE.
7-108. The oil cooler bypass valve prevents high back-pressure at the pump case. Back- pressure can result from cold fluid or a restricted oil cooler passage. The valve is set to open at 15 PSI (1.05 kg/cm2) pressure at normal operating temperature. During cold start conditions or if flow through the cooler becomes restricted, the valve opens to allow flow from the pump directly to the hydraulic tank.

7-109. SHUTTLE VALVE.
7-110. When in neutral, the shuttle valve directs oil flow to the cooling circuit. The shuttle valve prevents loss of high pressure oil when transmission is reversed.

7-111. CONTROL FUNCTION.
7-112. The charge pump provides oil under pressure to control valves.

7-113. MAKE-UP CIRCUIT.
7-114. The charge pump provides oil to the circuit to make up for internal leakage.

7-115. HYDROSTATIC PUMP ASSEMBLY.
7-116. The hydrostatic transmission employs a variable displacement hydraulic pump driving a fixed displacement hydraulic motor to transfer engine power to the final drive.
7-117. The hydrostatic pump assembly is attached to, and driven by, a hub assembly on the engine flywheel.

7-118. VARIABLE DISPLACEMENT HYDROSTATIC PUMP (see figure 7-36).

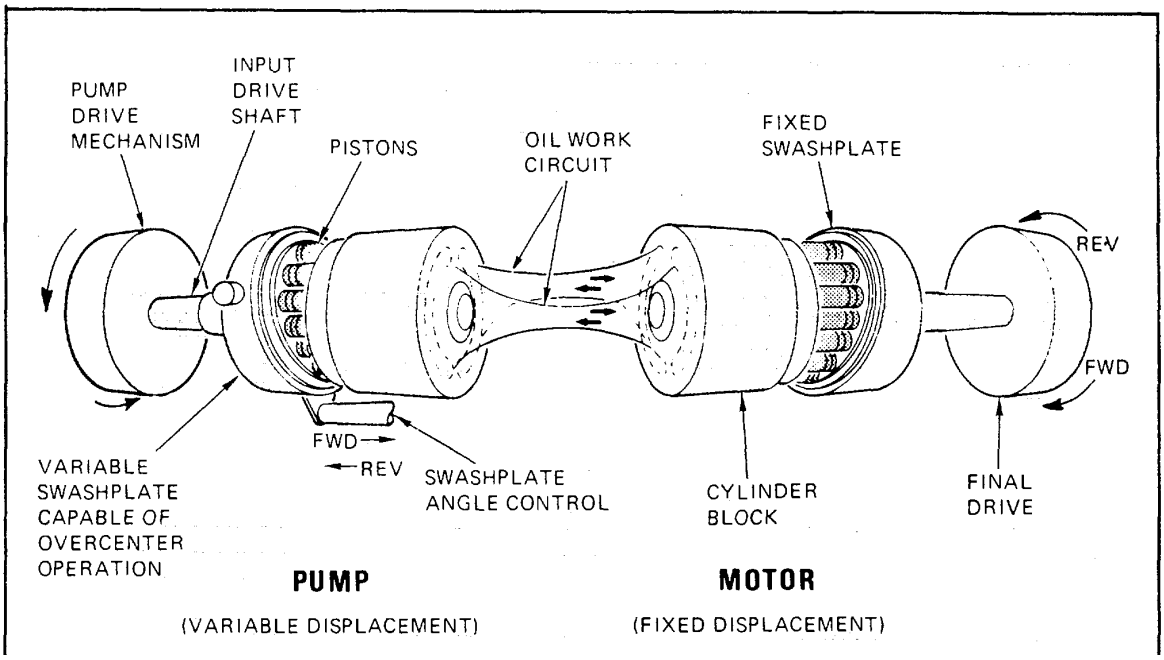

FIGURE 7-36.

7-119. The variable displacement hydrostatic pump consist primarily of a drive shaft, charge pressure relief valve, replenishing check valves, servo pistons, swashplate, cylinder block assembly and valve-bearing plate.

7-120. The pump drive shaft is splined into the center of the cylinder block. The cylinder block assembly contains nine (9) cylinder pistons. When the engine is running the cylinder block and pistons are always rotating.
7-1 21. Movement of the Direction-Throttle Control Bail causes the servo control circuit to act on the displacement control valves. These valves cause one or the other of the two (2) servo pistons to move the pump swashplate.
7-122. The pump swashplate can tilt either side of center. When the swashplate in exactly centered, the transmission is in neutral.
7-123. Each cylinder piston has a slipper plate at one end. The slipper retainer keeps all nine
(9) slippers in contact with the thrust plate which contacts the swashplate. When the swashplate is centered, the cylinder pistons do not stroke in the cylinders. When the swashplate is tilted, the cylinder pistons stroke. The degree of tilt determines the volume (displacement) of oil pumped by each ,cylinder piston.
7-124. The valve-bearing plate contains elon- gated ports that are in contact with the cylinder block. The opposite side of the valve-bearing plate mates with the pump end cap. Two ports in the end cap are connected through high-pressure lines to a hydrostatic motor.
7-125. When the swashplate is tilted, each cylinder piston moves back and forth in its cylinder with each revolution of the cylinder block. When a piston rotates past the inlet ports in the valve-bearing plate, it moves out of the block and draws low-pressure oil into the cylinder. This is the intake stroke of the piston. Further rotation of the cylinder block moves the filled cylinders toward the outlet ports in the valve-bearing plate. They are forced into the cylinder block by the tilt of the swashplate. The oil under high pressure ports to the outlet port in the end cap through the valve-bearing plate. With the swashplate tilted to either side of center, one side will be forward vehicle motion with one main circuit line to the motor being high-pressure and the other being return. The opposite tilt of the swashplate reverses the vehicle direction and it also reverses the high-pressure and return functions of the main circuit lines.
7-126. When the transmission is in neutral, the swashplate in the hydrostatic pump is also in neutral and the cylinder pistons are not stroking. In this mode no oil is being pumped into the main circuit, therefore, the cylinder block assembly in the motor is stationary and the motor output shaft does not turn.

7-127. CHARGE PUMP.

7-128. A charge pump is a part of the hydrostatic pump assembly. Whenever the engine is running, oil is being drawn from the tank through the suction filter by the charge pump.

7-129. CHECK VALVES.

7-130. There are two (2) check valves in the hydrostatic pump assembly. With the transmission in neutral, both check valves will open allowing charge pressure to lubricate the system. With the transmission out of neutral, one of the valves will be closed and the other open. The valve on the high-pressure side of the main circuit will be held closed by high-pressure. The other valve will admit oil from the charge pump to the low-pressure side of the cylinder block assembly to maintain adequate oil in the loop.

7-131. SERVO CONTROL SYSTEM.

7-132. Control of swashplate angle (displacement) is accomplished in the hydrostatic pump by use of a powered servo system.

7-133. DISPLACEMENT CONTROL VALVE.

7-134. The Displacement Control valve assembly is a closed center four-way valve with the servo pressure ports exhausted at the center (neutral) position. The valve is operated through internal linkage connections with both the swashplate and the external control (Direction-Throttle Control Bail).
7-135. To put the pump in stroke, the control handle moves the displacement control spool through a torsion spring. Once the swashplate angle is set, a feed-back link returns the displacement spool almost to neutral where it ports just enough oil to the servo cylinder to keep the swashplate at the proper angle.

7-136. When the Direction-Throttle Control Bail is released, the displacement control spool tends to be returned to neutral by a spring.

7-137. SERVO CONTROL CYLINDERS.

7-138. The hydrostatic pump is equipped with two (2) servo cylinders. They are controlled by low-pressure oil directed from the displacement
control valve.

7-139. When the pump is stroked, oil under charge pressure is ported to the servo cylinder. The piston moves the swashplate against the opposite servo spring. Both servo springs are constrained so that they can only force the swashplate toward neutral. When the swash-plate has moved to the angle set by the control handle, the feed-back link returns the displacement control spool almost to neutral where it ports just enough oil to the servo cylinder to keep the swashplate at the proper angle. 7-140. When the Direction-Throttle Bail is released, the displacement control spool is returned to neutral by a spring. This allows oil from both servo cylinders to flow into the case through the small underlaps. Both servo cylinders are thus exhausted and one of the servo springs mechanically forces the swash- plate to neutral.

7-141. HYDROSTATIC MOTOR ASSEMBLY (see figure 7-36).

7-142. The fixed displacement motor is an axial-piston motor that converts fluid power (received from the variable displacement pump) into rotary mechanical power.

7-143. The fixed displacement motor is attached to the unit final drive mechanism at the right-hand side of the drive drum (as viewed from the rear of the unit). The ports of the variable displacement pump are connected to the motor through high-pressure hoses.

7-144. FIXED DISPLACEMENT HYDROSTATIC MOTOR.

7-145. The fixed displacement hydrostatic motor output is coupled to a final drive by a shaft extending through the center of the drive drum.

7-146. The hydrostatic motor converts high- pressure hydraulic power into rotary mechanical power. The motor shaft can rotate in either direction. The action of the hydrostatic pump reversing the direction of oil in the main circuit reverses the direction of the motor output shaft.

7-147. The motor shaft and cylinder block assembly rotate together. The direction of rotation depends on the direction of the high-pressure oil entering the motor from the hydrostatic pump. High-pressure oil enters one of the motor main ports to push the cylinder pistons out of their cylinder and firmly against the motor swashplate. This action causes each piston slipper, which is protected by a thin film of oil to slide down the face of the thrustplate, rotating the entire cylinder block assembly. The cylinder block is splined to, and rotates the motor output shaft. As the cylinder block rotates and the filled cylinders pass the other main port, return oil flows to the hydrostatic pump at low-pressure. The speed at which the cylinder block rotates is determined by the volume of pump output oil.

7-148. MANIFOLD.

7-149. The manifold is connected across the high-pressure and low-pressure sides of the main circuit. It includes:

(1) two high-pressure relief valves
(2) a shuttle valve
(3) a low-charge-pressure relief valve.

7-150. HIGH-PRESSURE RELIEF VALVES.

7-151. Two high-pressure relief valves are part of the manifold. They serve to prevent abnormal pressure surges in either of the two branch lines of the main circuit. They accomplish this by dumping oil from the high-pressure line to the low-pressure line. Situations such as rapid acceleration, abrupt braking and sudden application of load will activate the relief valves.

7-152. SHUTTLE VALVE.

7-153. At other than neutral setting, the shuttle valve establishes a connection between one of the low-charge-pressure relief valves and whichever branch of the main circuit is at low-pressure. This connection provides a control of charge pressure and a path for excess oil to escape to the cooling circuit. When the two branches of the main circuit are reversing their high-pressure and low-pressure functions, the spring-centered design of the shuttle valve closes the valve to prevent loss of

high-pressure oil.

7-154. LOW-CHARGE-PRESSURE RELIEF VALVE.
7-155. The low-charge-pressure relief valve works with the shuttle valve to control pressure in the charge circuit and to remove excess oil to the cooling circuit. This valve will allow additional oil to dump if the high-pressure relief valves cannot dump fast enough under excessive conditions. Excess oil will be ported through the drain circuit to the oil cooler. It is operative only when the transmission is **not** in neutral.

7-156. PRESSURE CHECKS.
7-157. Pressure checks are imperative in troubleshooting the hydraulic system.

7-158. CHECKING NEUTRAL CHARGE PRESSURE (see figure 7-37).
7-159. Neutral charge pressure can be checked at the transmission pump as follows:

a. Remove the threaded plug from the charge pressure port. Install a 600 PSI (40 kg/cm$^{2)}$ gauge equipped with a short section of hose. Make sure the gauge is accurately calibrated.

NOTE: Use a 7/16 x 20 o-ring adapter in the port.

b. Place the Direction-Throttle Control Bail in neutral.

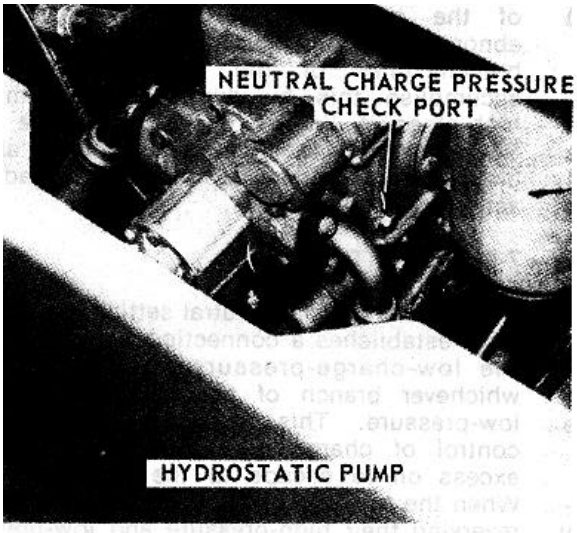

FIGURE 7-37.

c. Start the engine and increase speed to 1500 RPM. The gauge should indicate 190 to 220 PSI (13.36 to 15.47 kg/cm2) above case pressure with oil at operating temperature. If. the pressure is not within the specified limits, troubleshoot the system as specified in Table 5-2B.

7-160. CHECKING LOW CHARGE PRESSURE (see figure 7-38).
7-161. The low charge pressure should be between 150 and 180 PSI (10.55 and 12.66 kg/cm2) above case pressure with oil at operating temperature, when the transmission is operating in forward or reverse. The low charge pressure relief valve is located in the motor manifold as shown in figure 7-38. Check the pressure as follows:

a. Remove the threaded plug from the Low Charge Pressure Check Port. Install a 600 PSI (40 kg/cm2) gauge equipped with a short section of hose. Use an o-ring adapter in the port. Make sure that the gauge is accurately calibrated.

b. Block the drive drum safely off the ground and start the engine.

c. Increase engine speed to 1500 RPM. Move the Direction-Throttle Control Bail slightly to

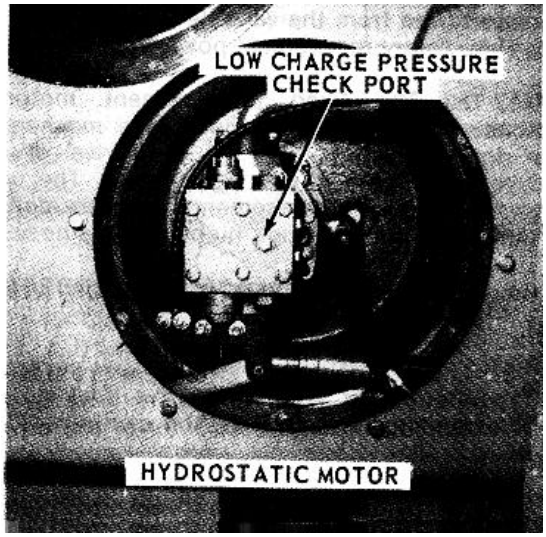

FIGURE 7-38.

the forward and reverse positions. The gauge should indicate 150 to 180 PSI above case pressure (10.55 to 12.66 *kg/cm2)* in each direction.

d. If the pressure is not within the specified limits, replace the low charge pressure relief valve. If this fails to correct the pressure, troubleshoot the system as specified in Table 5-2B.

WARNING: Changing the quantity of shims in the relief valve is not recommended

7-162. CHECKING HIGH PRESSURE RELIEF (see figure 7-39).

CAUTION: Transmission should **NOT** be stalled at high pressure relief for periods longer than 15 seconds.

7-163. The pressure in the high-pressure lines should be 5500 PSI (386.7 kg/cm2) when the transmission is in a stalled condition. Two (2) high-pressure relief valves are located in the motor manifold as shown in figure 7-39. Two (2) check ports are located at the side of the manifold for checking the setting of the relief valves. Check the high-pressure valves as follows:

WARNING: In order to check the high-pressure relief valves it is necessary to bring the unit to stall. CAUTION must be taken to ensure the safety of personnel when attempting to stall the unit.

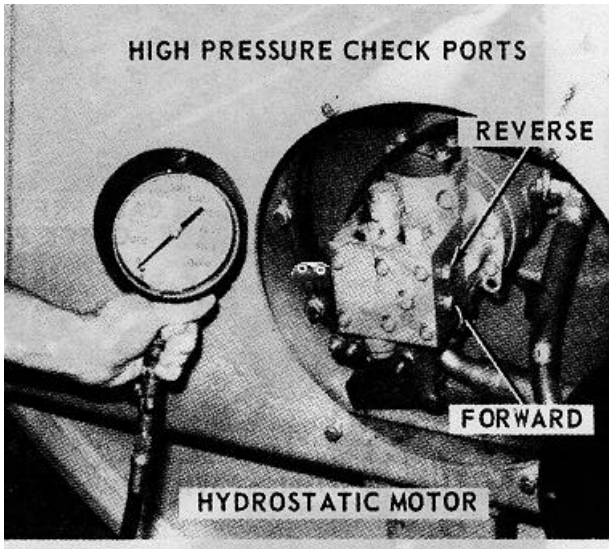

FIGURE 7-39.

a. Movement of the unit must be safely restricted.

b. Remove the cover from the right-hand side of the frame at the drive drum.

c. Connect a 10,000 PSI (700 kg/cm2) gauge to the REVERSE check port (see figure 7-39).

d. Start the engine and set Park Brake. Increase engine speed to 1500 RPM.

e. Slowly move the Direction-Throttle Control Bail in the Reverse direction from neutral and bring the unit to stall. Observe the pressure gauge. With the transmission stalled, the gauge should indicate 5500 PSI (386.7 kg/cm2). If not, stop the engine and remove the two (2) high-pressure relief valves. It will be necessary to disconnect the two (2) high-pressure hoses.

f. Reverse the relief valves in the manifold ports and recheck at the REVERSE check port. If the pressure is normal, replace the relief valve originally removed from the reverse side of the manifold. If the pressure remains abnormal, troubleshoot the transmission as specified in Table 5-2B.

WARNING: Changing the quantity of shims in the relief valves is not recommended.

g. If pressure reading at Reverse port was normal then connect the gauge to the FORWARD check port (see figure 7-39).

h. Start the engine again and increase speed to 1500 RPM.

i. Slowly move the Direction-Throttle C6ntrol Bail in the Forward direction from neutral and bring the unit to stall. Observe the pressure gauge. With the transmission stalled, the gauge should indicate 5500 PSI (386.7 kg/cm2). If not, stop the engine and remove the two (2) high-pressure relief valves.

j. Reverse the relief valves in the manifold ports and recheck the pressure at the FORWARD port. If the pressure is normal, replace the relief valve originally removed from the forward side of the manifold. If the pressure remains abnormal, troubleshoot the system as specified in Table 5-2B.

k. Stop the engine and disconnect the gauge. Install all plugs and tighten all fittings

securely.

7-164. CHECKING CONTROL PRESSURE (see figure 7-40).

7-165. The control pressure can be checked at the transmission pump as follows:

a. Remove the. threaded plugs from the two check ports and install a 600 PSI (40 kg/cm2) gauge equipped with a short hose in each port. Make sure that the gauges are accurately calibrated.

b. Place the Direction-Throttle Control Bail in neutral. Block the drive drum safely off the ground.

c. Start the engine and set speed at approximately 1500 RPM with the transmission in neutral. Shift the Direction-Throttle Control Bail to the forward position and observe the gauge. The pressure should be 45 PSI (3.2 kg/cm2) initially, then gradually reach charge pressure. Shift the Control Bail to the reverse position. The gauge should indicate 45 PSI (3.2 kg/cm2) initially, then gradually reach charge pressure.

d. If the pressures in both the forward and reverse directions is not as specified, the control valve assembly may be dirty or defective. If the pressure is abnormal in one direction only, the associated servo piston may be leaking.

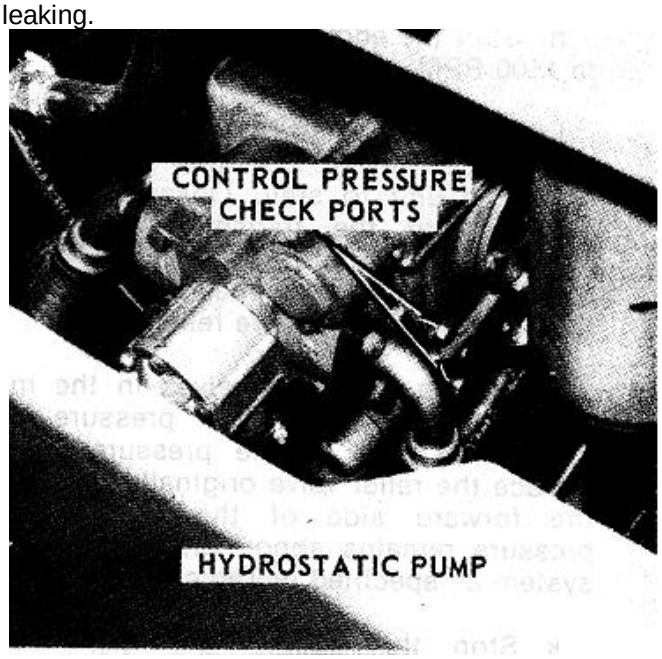

FIGURE 7-40.

7-166. CHECKING CASE PRESSURE (see figure 7-41).

7-167. Case pressure should not be greater than 40 PSI (2.8 kglcm2). Attach adequate gauge to either pump or motor case as shown in figure 7-11.

7-168. VACUUM CHECK

7-169. The suction filter is equipped with a vacuum gauge which indicates flow from the tank to the charge pump. The maximum vacuum at the charge pump inlet should not exceed ten inches (254 mm) of mercury at normal operating conditions. During cold start-up it is acceptable to have a higher reading. The unit should not be operated until hydraulic oil is at normal operating temperature and vacuum is below 10 inches (254 mm) of mercury.

7-170. ADJUSTMENTS.

7-171. DISPLACEMENT CONTROL VALVE **NEUTRAL ADJUSTMENT (see figure 7-42).**

WARNING: The drive drum MUST be safely blocked off the ground. Any movement of control valve spool causes the unit to shift out of neutral and the drum will turn. Caution personnel to stand clear of the drive drum.

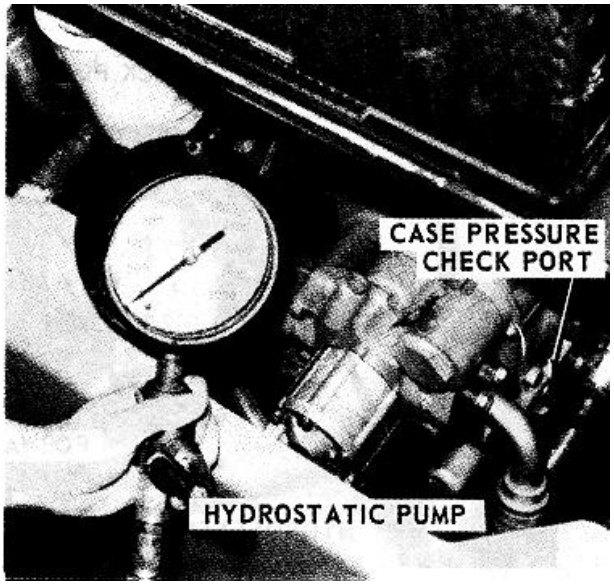

FIGURE 7-41.

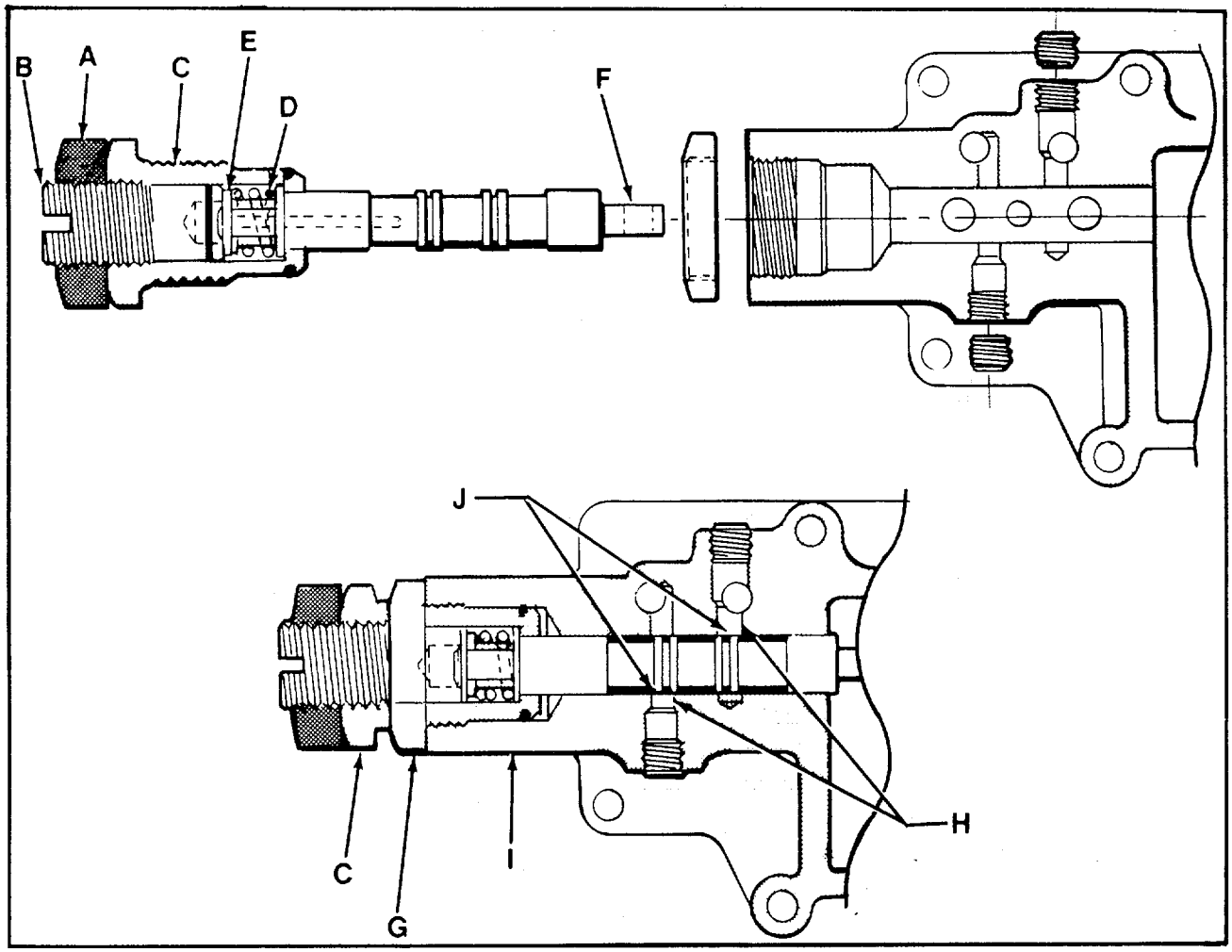

FIGURE 7-42

a. Remove end play from centering spring mechanism with lockout (Ref. A) loose and holding the centering spring housing (Ref. C), turn the spring adjusting screw (Ref. B) until the screw is just touching the centering spring washer; thus taking the free end play out of the centering spring mechanism. This is best done by exerting a light back and forth force on the control valve spool (Ref. F) at the same time adjusting screw is being turned down. Care must be taken not to compress the centering spring (Ref. D) beyond its installed height. Tighten the locknuts (Ref.A) and recheck the spool (Ref. F) for end play.

b. Adjust control valve spool for neutral position. Remove the 7/16 x 20 straight thread o-ring plugs on either side of the control valve housing (Ref. I) to reveal the servo cylinder porting holes (Ref. H). Loosen locknut (Ref. G) and adjust the control valve by screwing the centering spring housing (Ref. C) in or out so that the open areas (shaded areas of Ref. J) between the spool lands and sides of the porting holes are equal. Tighten locknut (Ref. G), recheck the open areas and reinstall the two 7/16 x 20 plugs.

7-172. TRANSMISSION CONTROL LINKAGE ADJUSTMENT (see figure 7-43).

a. Place Direction-Throttle Control Bail in neutral (vertical) position. Adjust control cable at pump so that jam nut on end of cable has full thread engagement and no more. Tighten jam nut securely. Loosen jam, nut on engine flywheel housing and adjust cable so that the swivel on the servo pump control arm is centered in the bracket. Tighten jam nut securely. Measure distance between swivel bracket and external cable end. These must be a minimum of 13/32 in.(27.69 mm). Refer to figure 7-43.

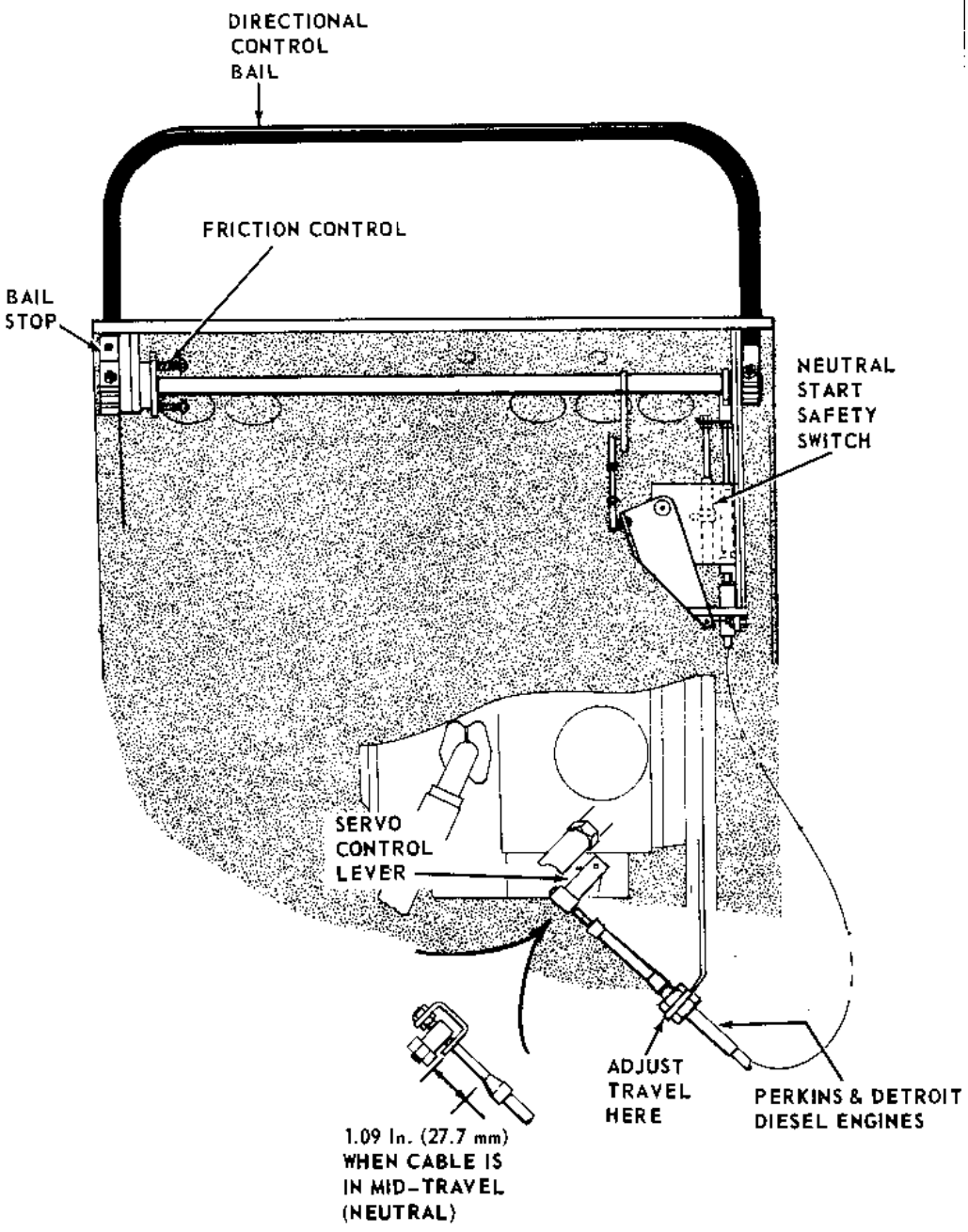
DIRECTIONAL CONTROL BAIL
FRICTION CONTROL
BAIL STOP
NEUTRAL START SAFETY SWITCH
SERVO CONTROL LEVER
ADJUST TRAVEL HERE
PERKINS & DETROIT DIESEL ENGINES
1.09 In. (27.7 mm) WHEN CABLE IS IN MID-TRAVEL (NEUTRAL)

FIGURE 7-43.

b. Adjust and tighten ball joint of control cable at bail shaft end. Adjust neutral start safety (transmission lockout) switch so that it makes contact in neutral.

c. Move Direction-Throttle Control Ball in the forward direction until control cable at servo lever has traveled 11/16 - 31 /32 In.(24.64 - 26.92 mm). Adjust ball stops so that cable cannot be moved beyond this point.

d. Repeat step c In reverse direction.

CAUTION: Ensure that the amount of ball (control cable) travel is limited by bail stops and not the interval servo stops.

e. Return Direction-Throttle Control Bail to neutral (vertical) position.

f. Adjust and tighten wire stop at throttle crank for 1/16 in. (1.59 mm) gap between swivel and wire stop (see figure 7-44).

g. Adjust ball joint in slotted crank on bail shaft to allow full throttle when bail is moved to either full forward or full reverse.

h. Adjust friction control nuts and spring assembly so that Direction-Throttle Control Bail will remain in any desired position.

7-173. THROTTLE CONTROL LINKAGE ADJUSTMENT PROCEDURE (see figure 7-44).

a. Adjust transmission control linkage per procedure outlined in paragraph 7-172 (Sundstrand).

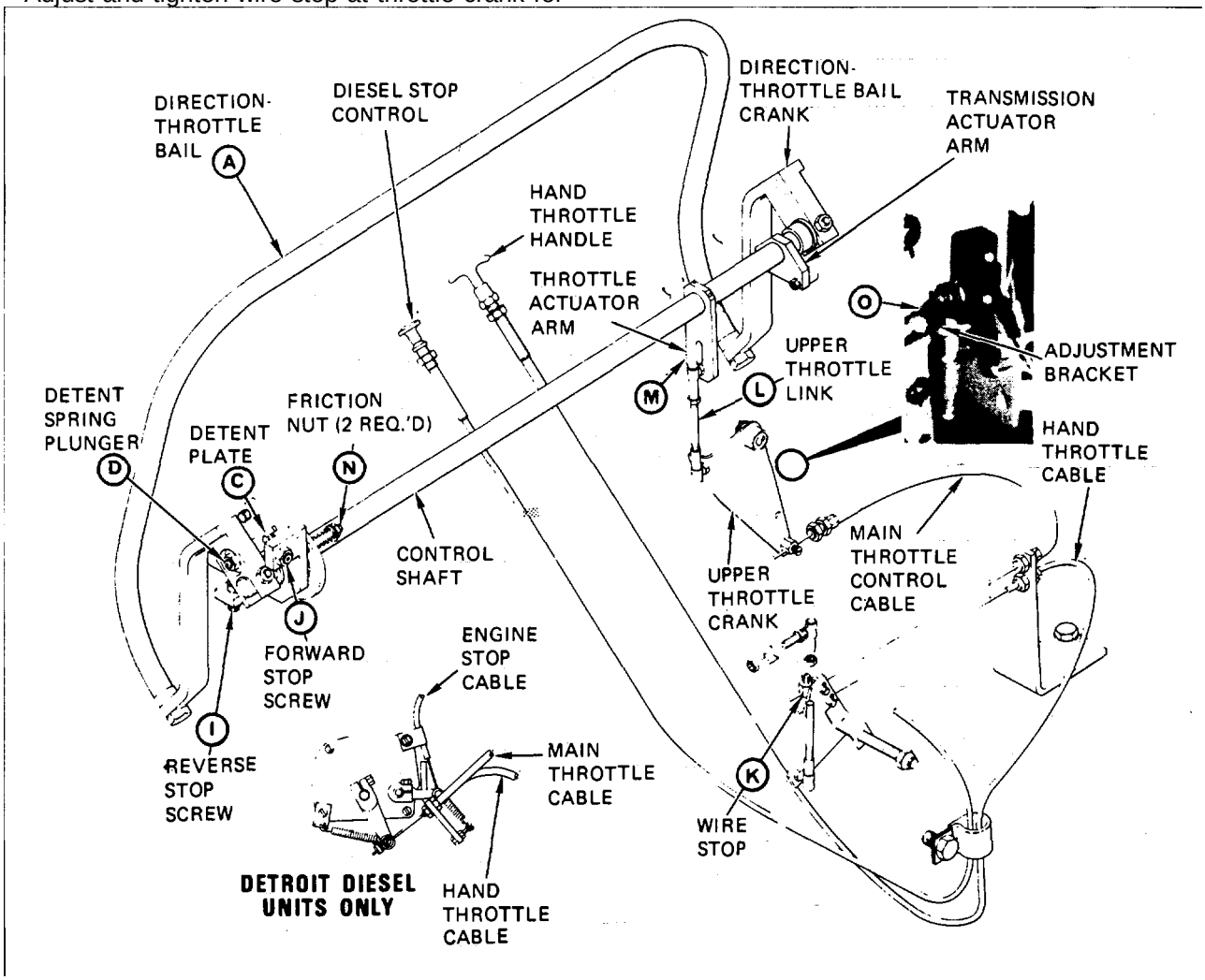

FIGURE 7-44

b. Place Direction-Throttle Bail in detonated neutral position.

c. Adjust wire stop (A) at lower throttle crank for 1/16 in. (1.59 mm) gap between swivel and wire stop.

d. Adjust position of upper throttle link (B) ball joint in slot of throttle actuator arm (C) so that full stroke of throttle is obtained when Direction-Throttle Bail is stroked from stop to stop. LENGTHEN upper throttle link (B) to reduce throttle stroke or SHORTEN link to increase throttle stroke.

NOTE: Throttle stroke should be identical in forward and reverse. Check for bent or binding linkage if a problem exists.

e. Adjust friction nuts (D) so Direction Throttle Bail will stay in any position.

f. Adjust the neutral safety switch adjustment bracket (E) so that the switch will just barely be activated when the Direction-Throttle Bail is in neutral position.

7-174. TRANSMISSION REPAIR.

7-175. Should it become necessary to perform repairs to the Sundstrand transmission during the warranty period, certain parts, components or kits may be replaced without affecting or violating the warranty.

7-176. The following parts, components or kits may be replaced in the field as an assembly without affecting, violating or voiding the transmission warranty:

a. Charge pump
b. Check valves
c. Motor manifold assembly
d. High-pressure relief valves
e. Displacement control valve (pump)
f. Pump or motor shaft seals

7-177. The proper procedures for replacement of the above components are presented in the following paragraphs.

NOTE: Unauthorized repairs to transmission components other than those listed in paragraph 7-176 may void the warranty. Contact Hyster Company before attempting to perform repairs other than those presented in this manual.

CAUTION: When working on all hydraulic equipment, cleanliness is very important. Before removing any of the transmission components, clean the immediate area to prevent dirt from entering the transmission.

CAUTION: Whenever a component of the hydrostatic system has been re- moved, the transmission start-up procedure MUST be performed before the unit can be started, operated or returned to service.

7-178. HYDROSTATIC PUMP REMOVAL (see figure 7-45).

a. Remove the suction line at the filter and plug or cap hose and fitting.

b. Disconnect control linkage from servo control lever.

c. Disconnect the hydraulic lines at the top of the pump.

d. Disconnect the high-pressure lines from the pump end housing. Plug or cap all hoses and fittings.

WARNING: Use a hoist and sling arrangement to support the weight of the pump.

e. Remove the capscrews securing the pump to mount plate.

f. Pull pump straight back and tilt shaft end of pump up enough to lift pump from unit.

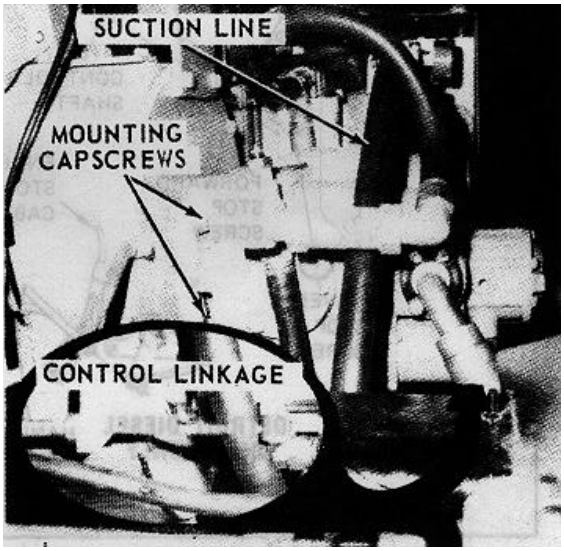

FIGURE 7-45.

g. Plug or cap all ports to prevent contamination.

7-179. REMOVAL OF HYDROSTATIC MOTOR (see figure 7-46).

a. Remove hydrostatic motor inspection plate on the right-hand side of the frame.

b. Disconnect high-pressure lines. Plug or cap ports on hoses. Remove the by-pass valve linkage.

c. Support the hydrostatic motor and remove the four (4) motor mounting bolts.

d. Carefully pull the motor far enough out of the motor carrier to remove the case drain line. Plug or cap all hoses and ports to prevent contamination of the hydrostatic system.

7-180. REPLACEMENT OF CHARGE PUMP.

7-181. REMOVAL (see figure 7-47).

a. Remove the line connecting the charge pump to the reservoir and plug to prevent draining of the reservoir. Remove the connector fitting.

b. Remove the four (4) capscrews.

NOTE: Do not remove the capscrews at the top and bottom of the charge pump (see figure 7-47).

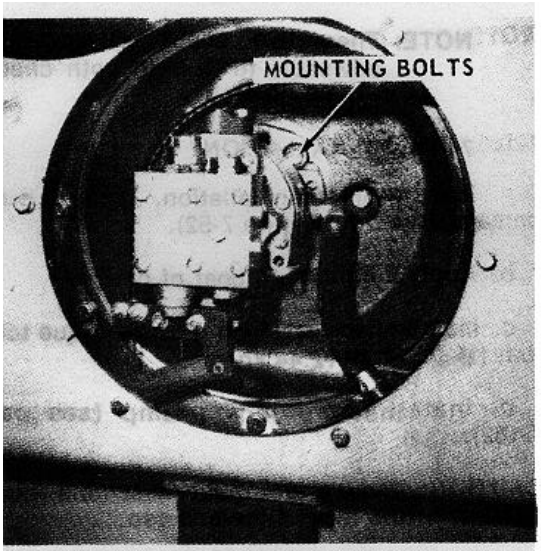

FIGURE 7-46.

c. Pull charge pump away from the main pump. Use caution not to drop aluminum spacer.

CAUTION: Do not use sharp tools to pry charge pump from main pump. A scratch on the sealing surface may cause leakage. If charge pump does not pull loose, tap LIGHTLY on the side of the charge pump with a plastic hammer to break paint or gasket seal.

7-182. INSTALLATION (see figures 7-48 and 7-49).

a. Install a new gasket. Make sure that the new gasket is properly installed as shown in figure 7-48. If positioned wrong, the relief valve port will be covered by the gasket.

b. Line the drive tank on charge pump shaft with the slot on the main pump shaft (see figure 7-49). The charge pump should assemble freely with the main pump. Do not force charge pump into position. Hold aluminum spacer in position with fingers to prevent its dislodging.

c. Torque the four (4) mounting bolts 10-11 ft. -lbs. (1 38-1.52 kg-m).

d. Install the connector to charge pump and torque to 14-20 ft.-lbs. (1.93-2.76 kg-m).

e. Install the line from the reservoir to the connector on the charge pump.

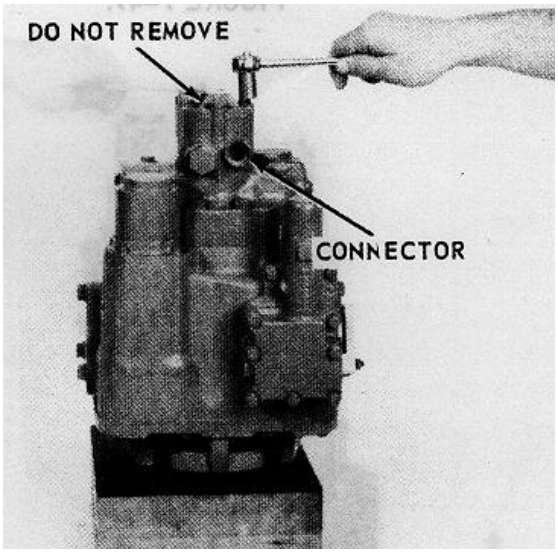

FIGURE 7-47.

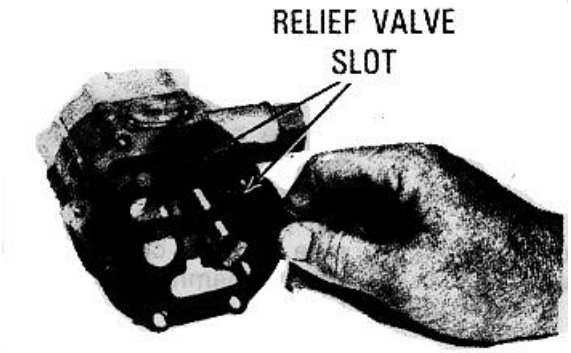

FIGURE 7-48.

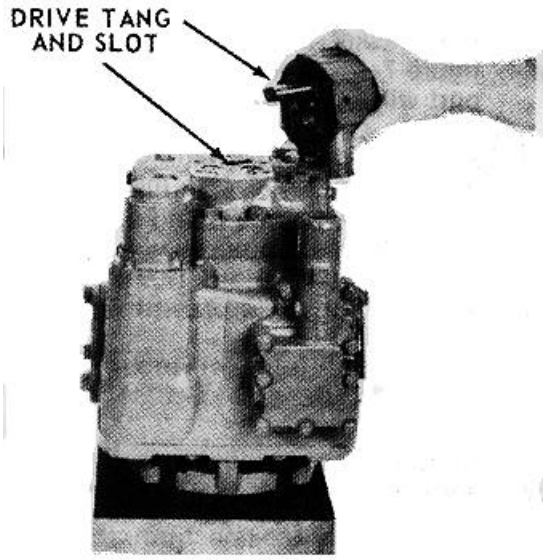

FIGURE 7-49.

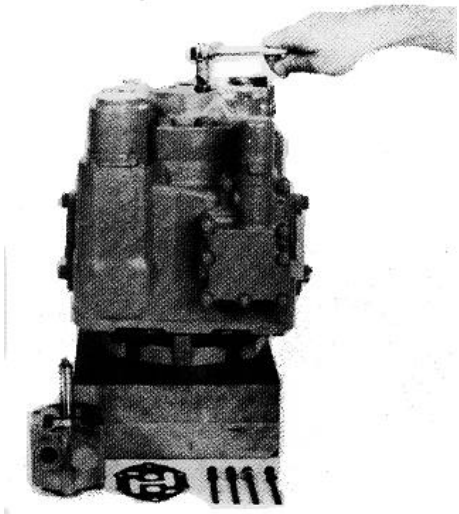

FIGURE 7-50.

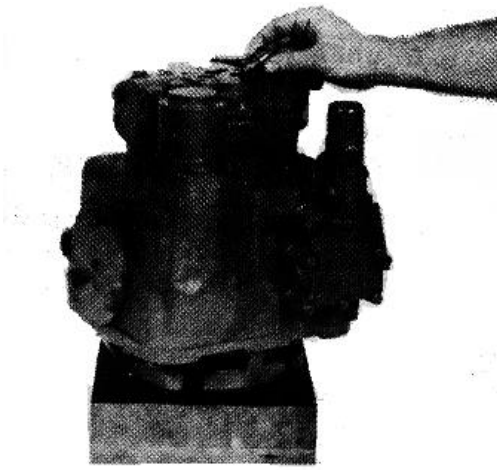

FIGURE 7-51.

NOTE: Excessive tightening may distort the charge pump and cause leakage or malfunction.

f. Check oil level in the reservoir.

7-183. REPLACEMENT OF CHECK VALVES.

7-184. REMOVAL.

a. Remove the charge pump (see paragraph 7-181).

b. Using a drag link, unscrew check valve from end cap (see figures 7-50 and 7-51).

NOTE: There are two check valves. It is advisable to replace both check valves at the same time.

7-185. INSTALLATION.

a. Prior to installation, inspect o-rings for damage (see figure 7-52).

b. Apply a light coat of oil.

c. Install check valves and torque to 80-90 ft.-lbs. (11.06-12.44 kg-m).

d. Install charge pump (see paragraph 7-182).

CAUTION: The valves must assemble below the face of the end cap.

7-186. REPLACEMENT OF BY-PASS VALVE AND MOTOR MANIFOLD.

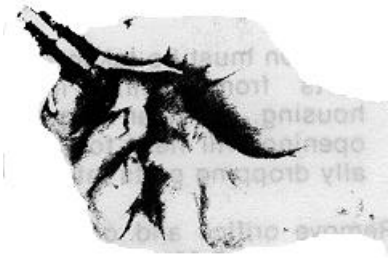

FIGURE 7-52

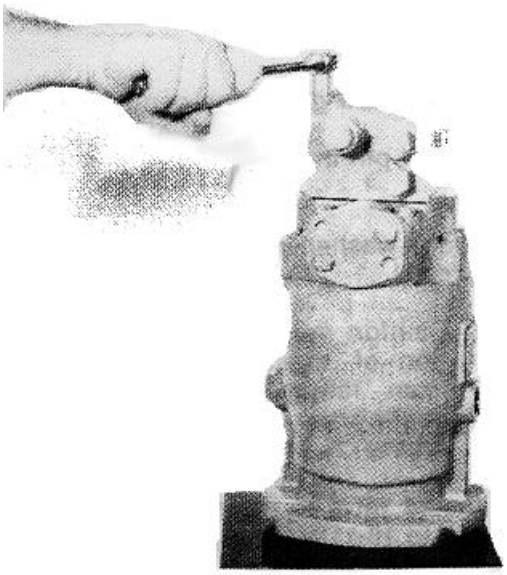

FIGURE 7-53.

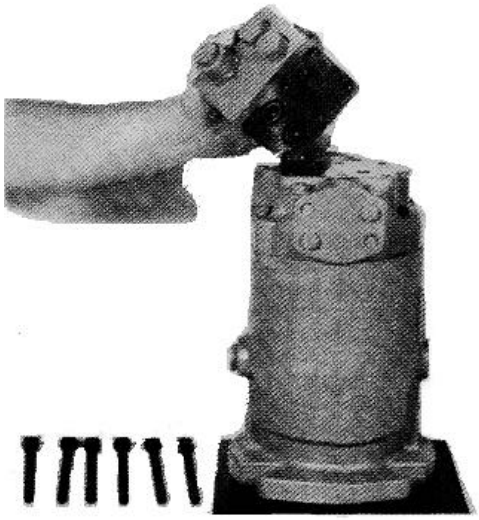

FIGURE 7-54.

7-187. REMOVAL.

a. Prior to removal of the manifold assembly remove all dirt and clean the area where manifold assembly is attached to the end cap.

b. Place drain pan under manifold to catch oil. Remove by-pass valve linkage.

c. Remove the four (4) corner bolts holding the manifold to motor end cap (see figure 7-53).

d. Grasp manifold to prevent it from dropping and remove the remaining two (2) mounting bolts (see figure 7-54). There is no gasket between the manifold and the end cap. Sealing is obtained by o-rings and back-up rings.

7-188. INSTALLATION.

a. Use new o-rings and back-up rings.

b. The two grooves side by side on manifold assembly (see figure 7-55) require an o-ring and a back-up ring (one of each per groove).

The o-ring goes into the groove first. Then install the back-up ring on top of the o-ring. The flat side of the back-up ring faces away from the o-ring.

c. The groove positioned by itself (see figure 7-55) requires only an o-ring.

d. Place the manifold against the motor end cap. Install the bolts while making certain that

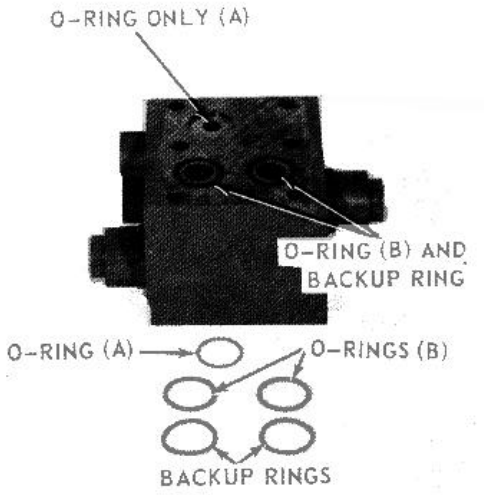

FIGURE 7-55.

the o-rings do not slip from their- grooves. Torque bolts to 19-21 ft.-lbs. (2.66-2.90 kg-m).

7-189. REPLACEMENT OF HIGH-PRESSURE RELIEF VALVES.

7-190. REMOVAL.

a. Apply a wrench on HEX portion of the valve and unscrew from manifold block (see figures 7-56 and 7-57).

NOTE: There are two relief valves in the manifold block.

7-191. INSTALLATION.

a. Prior to installation, inspect o-rings and back-up rings for damage.

b. Apply a lubricant to the o-ring and install in the manifold block.

c. Torque valves to 20 ft.-lbs. (2.76 kg-m).

7-192. REPLACEMENT OF DISPLACEMENT CONTROL VALVE.

7-193. REMOVAL.

a. Remove the control linkage from the displacement control valve assembly.

b. Remove the nine (9) capscrews holding the valve to the pump housing (see figure 7-58).

c. Lift the valve away from the housing and remove the cotter pin and washer (see figure7-59). Remove pin from link in the pump.

NOTE: Caution must be taken to prevent these parts from falling into the pump housing. A clean rag placed in the opening will help to prevent accidentally dropping parts into housing.

d. Remove orifice and o-rings from control valve (see figure 7-60). Check to ensure that orifice is open.

7-194. INSTALLATION.

a. Install orifice tip down, and new o-rings in control valve.

b. Install new gasket on control valve (dry).

c. Install pin in control valve links and pump links.

d. Place washer in pin, install the cotter pin and spread.

NOTE: Caution must be taken during installation of these parts to prevent them from falling into the unit. Lightly coating the parts with petroleum (**NOT** grease) is advised.

e. Install valve to motor and torque the nine (9) bolts to 10-11 ft.-lbs. (1.38-1.52 kg-m).

7-195. REPLACEMENT OF MOTOR OR PUMP SHAFT SEAL.

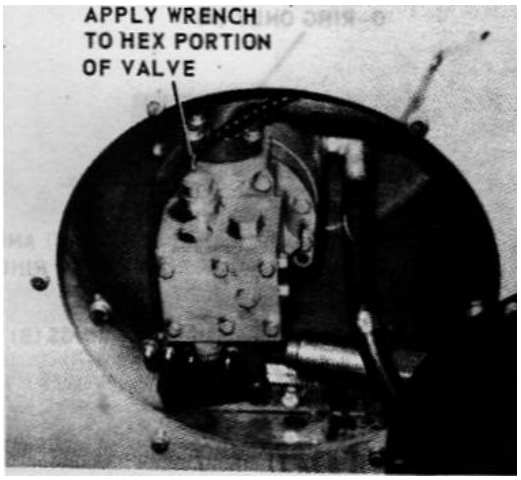

FIGURE 7-56.

FIGURE 7-57.

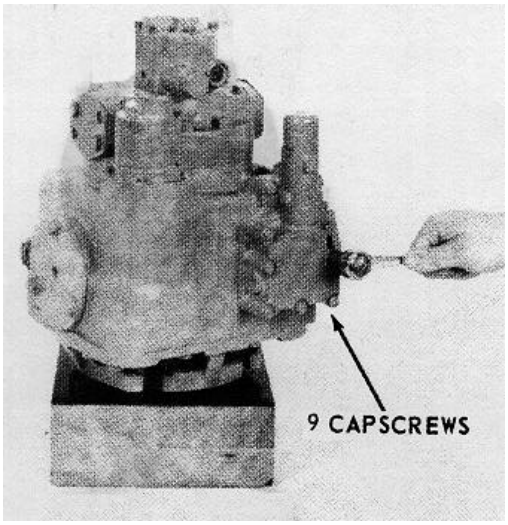

FIGURE 7-58.

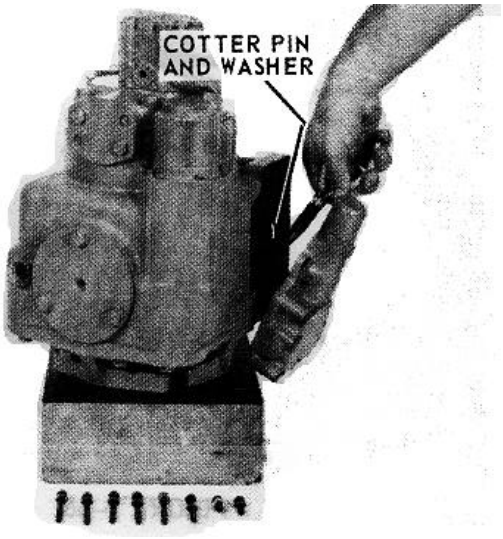

FIGURE 7-59.

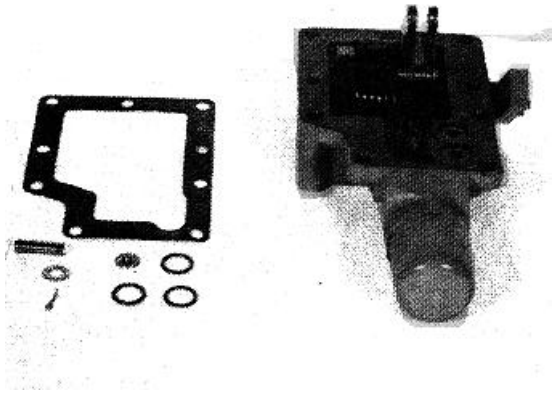

FIGURE 7-60.

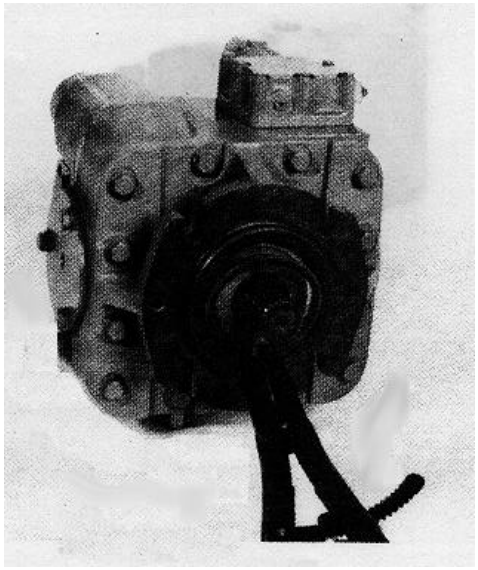

FIGURE 7-61.

7-196. REMOVAL.

a. Disconnect hoses and remove pump or motor from unit.

b. Insert Tru-Arc #7 pliers in snap ring holes, compress the ring and roll it out (see figure 7-61).

c. Remove the aluminum seal retainer with a screwdriver (see figure 7-62).

d. Remove the steel stationary seal. This seal will usually come out with the retainer (see figure 7-63).

e. With fingers or two screwdrivers remove bronze rotating part of the seal from drive shaft (see figure 7-64).

CAUTION: Use care not to damage bronze rotating ring or shaft splines.

f. See figure 7-63 and account for all the parts shown.

7-197. INSTALLATION.

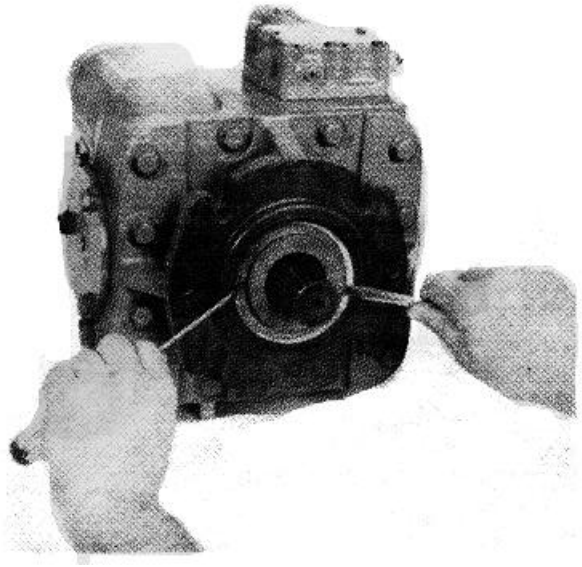

FIGURE 7-62.

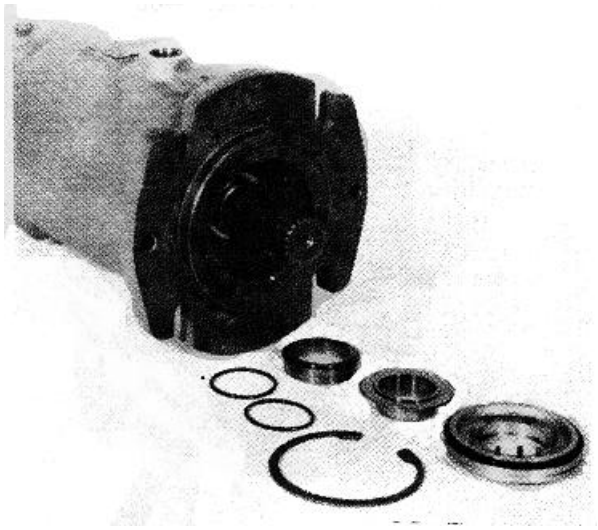

FIGURE 7-63.

CAUTION: Always replace both stationary and rotating parts of the seal. DO NOT mix old and new parts.

a. Wash and clean air dry new seal parts.

b. Install the seal springs into the aluminum seal retainer. Install the new o-rings (dry) on stationary steel part of seal into retainer so notch is located in pin in retainers (see figure 7-65).

c. Install large o-ring O.D. of retainer (see figure 7-65).

FIGURE 7-64.

FIGURE 7-65.

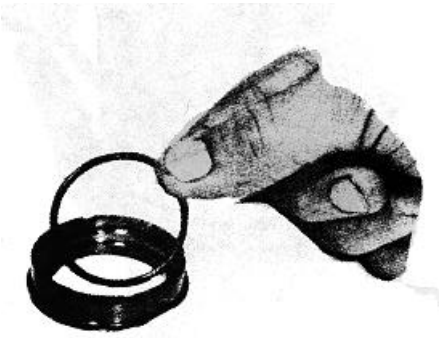

FIGURE 7-66.

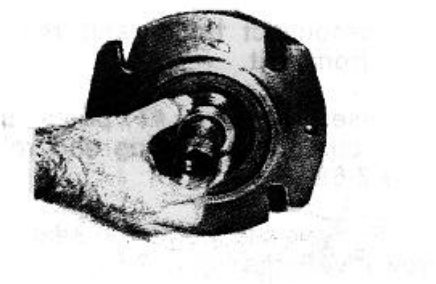

FIGURE 7-67.

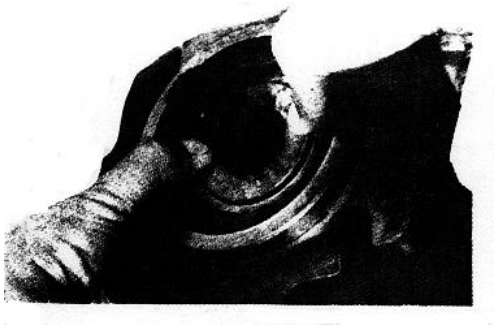

FIGURE 7-68.

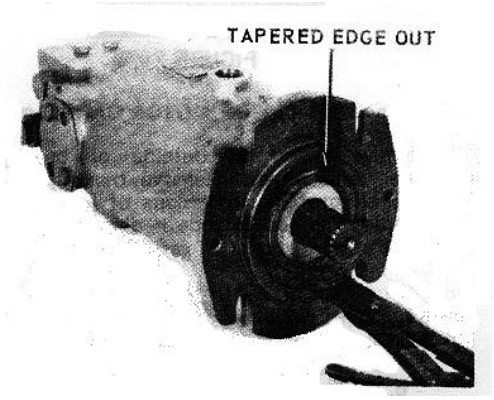

FIGURE 7-69.

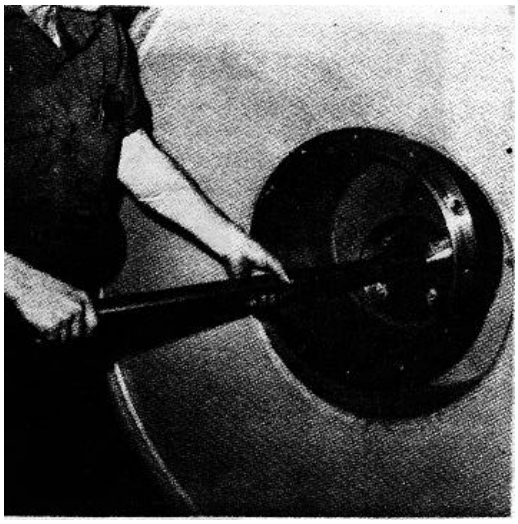

FIGURE 7-70.

d. Install new o-ring in I.D. of bronze rotating part of seal (see figure 7-66).

e. Wrap a piece of plastic around the drive shaft and slide the rotating bronze part over the shaft making sure It is sealed. Do not press on seal surface (see figure 7-67).

f. Install stationary seal and retainer into place and press the retainer in so the snap ring groove is open (see figure 7-68).

g. Close the snap ring with pliers. Install snap ring with tapered edge out.

h. For ease of installation, start snap ring in groove with the side opposite the snap ring holes (see figure 7-69).

7-198. REMOVAL OF DRIVE DRUM.

a. Complete the hydrostatic motor removal procedure presented in paragraph 7-179 (Sundstrand). Remove the drive shaft from the center of the drum (see figure 7-70).

b. Support the frame on both sides at the rear of the unit. Block the unit at the front and rear of the guide roll to prevent movement.

WARNING: The brake assembly will be removed prior to drum removal. Block the machine safety to prevent movement.

c. Complete brake assembly removal procedure presented in Section 10, paragraph 10.

d. Drain the final drive lubricant (refer to Section 4).

e. Remove the flange anchor capscrews. Before removing the hub capscrews, pull the anchor flange using the puller holes provided and appropriate capscrews. At the same time pry between the right side frame and drum moving the motor housing out of the side frame pilot (see figure 7-71).

f. Remove the hub (12 point) capscrews (C350B only) from the anchor flange and remove the flange from the drive drum. Then remove the brakeshaft outer snap ring (C350B only). Push brakeshaft in so that it will clear the frame for drum removal (see figure 7-72).

g. Carefully lift the drive drum from the unit. An alternate procedure is to remove the scraper beam at the rear of the unit and roll the drive

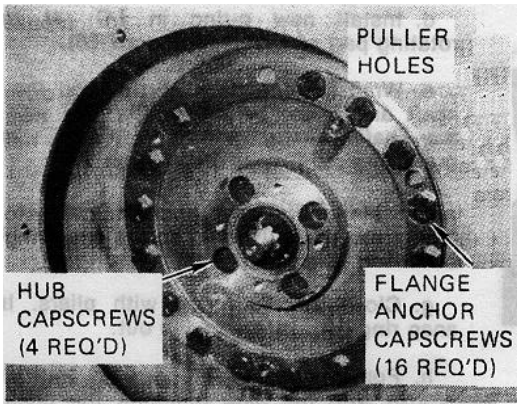

FIGURE 7-71.

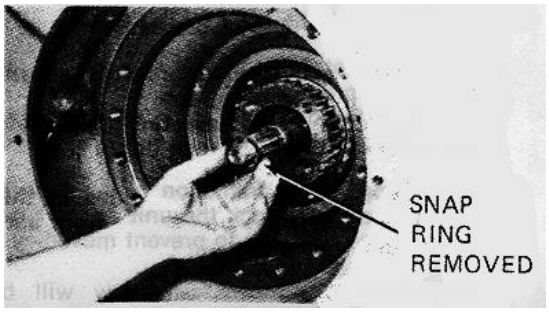

FIGURE 7-72.

drum out of the rear of the unit taking care not to damage machined surfaces (see figure 7-73).

CAUTION: Care must be taken not to damage machined surfaces.

WARNING: The drive drum is extremely heavy (approximately 12,000 lbs. (5,440 kg) without ballast.) Caution personnel in area to stand clear.

7-199. REMOVAL OF MOTOR CARRIER.

a. Complete the drive drum removal procedure presented in paragraph 7-198.

b. Remove the motor carrier-to-drum mounting capscrews by turning the carrier and aligning the hole in carrier with capscrews (see figure 7-74).

WARNING: Support the motor carrier with hoist and sling arrangement.

c. Using the puller holes provided, pull the carrier and lift from unit.

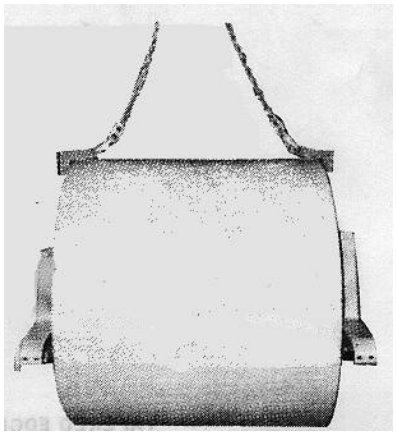

FIGURE 7-73.

7-200. DISASSEMBLY OF MOTOR CARRIER.

a. Remove o-ring on outside of bearing carrier for replacement. Remove bearing lock plate and shims. Check flatness of lock plate with a straight edge. Replace if deformed (see figure 7-75).

b. Lift off bearing carrier, upper bearing, and seal from motor housing. Tag the bearing cone with its respective cup (see figure 7-76).

c. Inspect the bearings, cups and cones. Remove bearing from the carrier and replace if the rollers or cups are worn, pitted or damaged in any way (see figure 7-77).

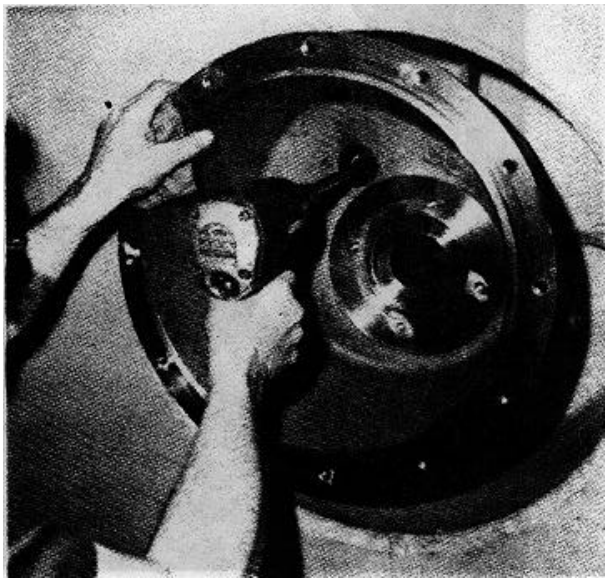

FIGURE 7-74.

FIGURE 7-75.

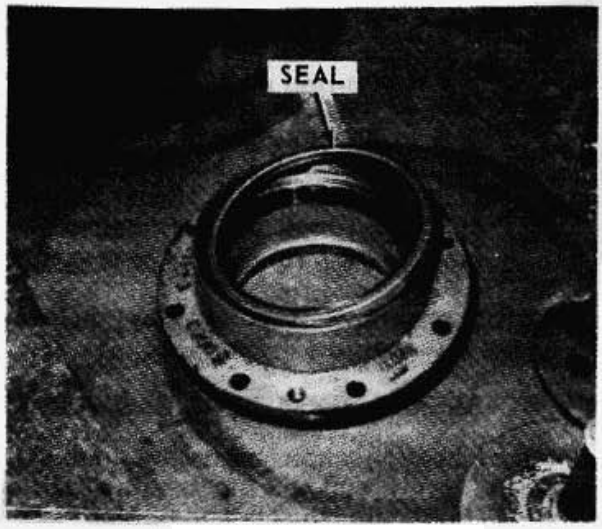

FIGURE 7-78.

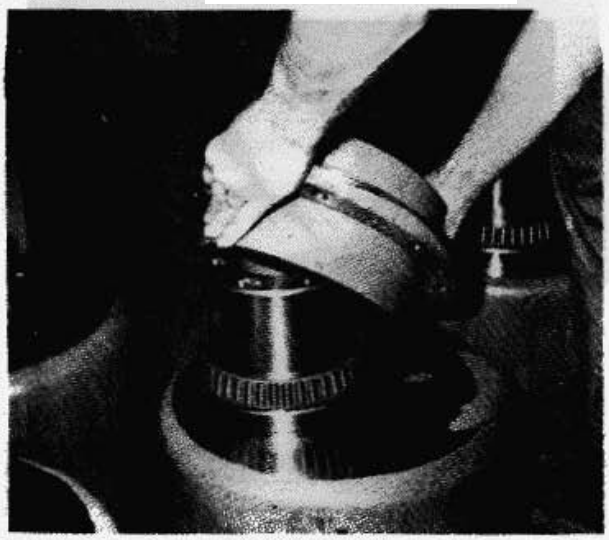

FIGURE 7-76.

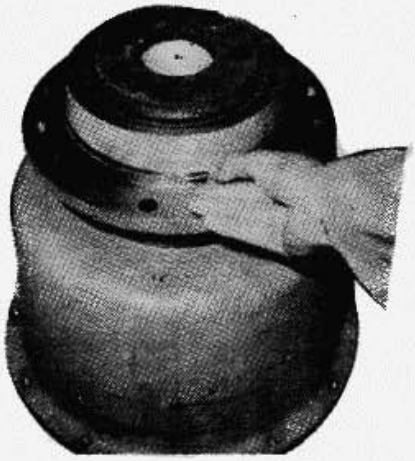

FIGURE 7-79.

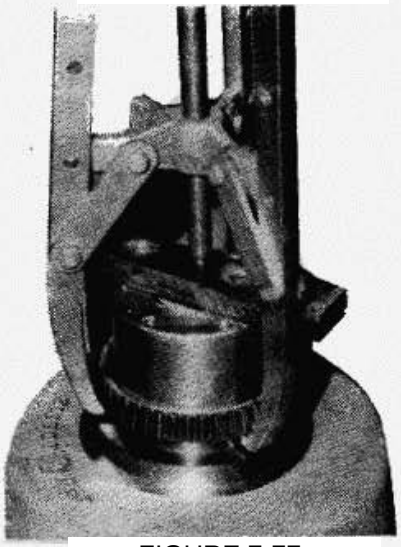

FIGURE 7-77.

FIGURE 7-80.

d. Remove oil seal for replacement.

CAUTION: The o-ring and oil seal in the motor side of the drive drum play a critical part in preventing premature failure of drum support bearing and the planetary system. These seals should be replaced during overhaul (see figure 7-78).

e. Replace o-ring if required by inspection in step c (see figure 7-79).

7-201. REASSEMBLY OF MOTOR CARRIER.

a. If new bearing cups are to be installed, press them firmly against the bearing carrier shoulders. Lubricate the bearings and cups with light machine oil or grease (see figure 7-80).

b. Install a new oil seal with a press. Avoid use of drifts and hammers. They may easily damage component parts. Lubricate the oil seal lip (see figure 7-81).

c. Install bearing on housing by heating slightly if necessary. Seat the bearing cone firmly against the motor housing shoulder (see figure 7-82).

d. Set the bearing carrier with bearing cups and oil seal on the housing mounted bearing cone (see figure 7-83).

e. Place the bearing cone around motor housing hub and seat it into the bearing cup (see figure 7-84).

FIGURE 7-81.

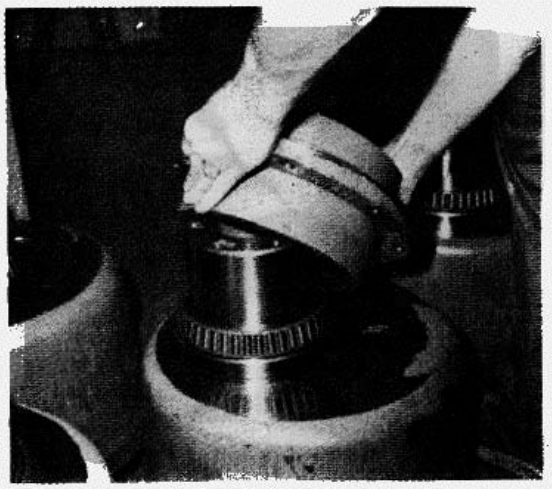

FIGURE 7-83.

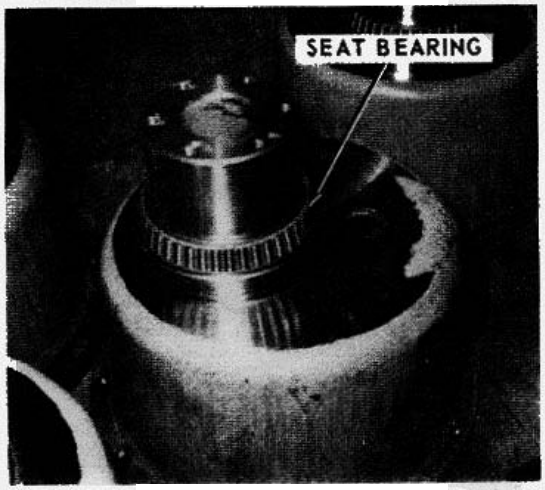

FIGURE 7-82.

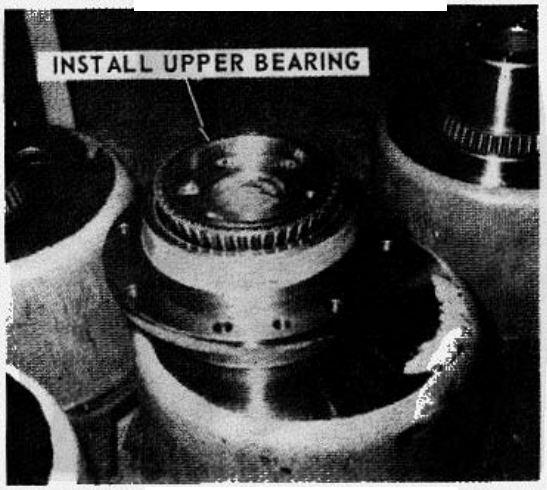

FIGURE 7-84.

NOTE: Rotate the bearing carrier on the motor housing hub to insure proper seating of the bearing and the oil seal lip.

f. Temporarily install the bearing retainer plate and torque the capscrews to 25 ft.-lbs. (3.457 kg-m). Rotate the bearing retainer on the motor housing hub to insure proper seating of the bearings (see figure 7-85).

g. Remove the bearing retainer plate and place a straight edge across the end of the motor housing hub and bearing cone. With a feeler gauge measure the distance between the motor housing hub and the straight edge (see figure 7-86).

h. Assemble a shimpack equaling measurement determined in step g plus .001 in. (.025 mm). Replace the bearing retainer plate and torque capscrews to 105 ft.-lbs. (14.521 kg-m) (see figure 7-87).

i. Install the o-ring (well lubricated) on the bearing carrier. Seat against the mounting flange (see figure 7-88).

FIGURE 7-85.

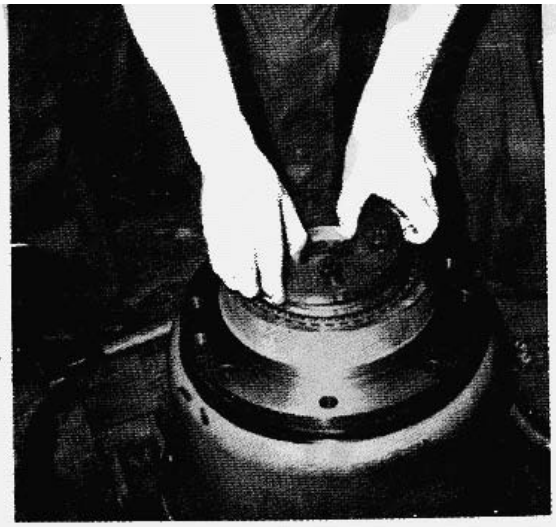

FIGURE 7-87.

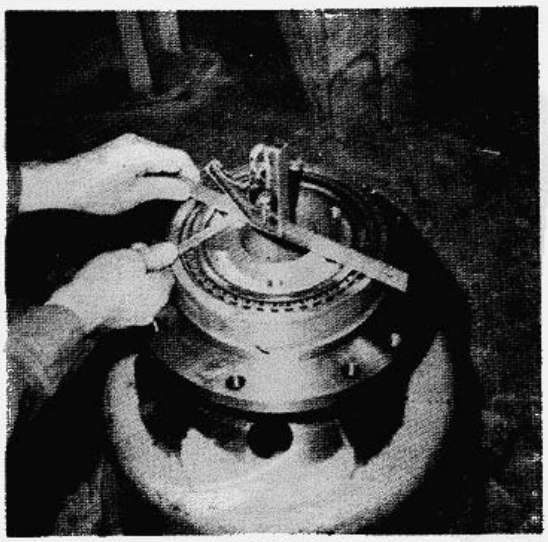

FIGURE 7-86.

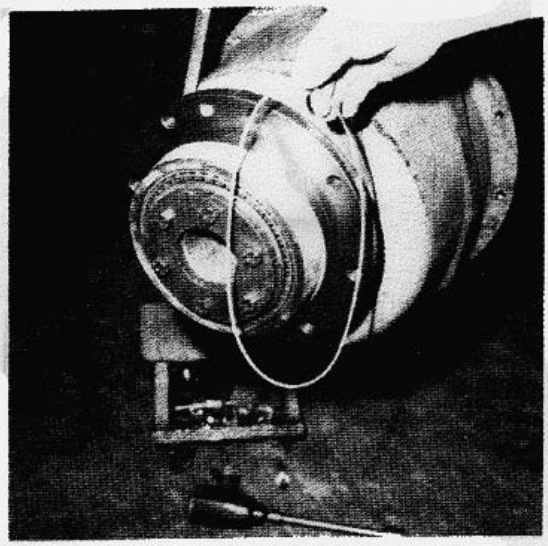

FIGURE 7-88.

7-202. INSTALLATION OF MOTOR CARRIER.

a. Lift motor housing with hoist and pilot the bearing carrier into the drum.

CAUTION: Care should be taken when installing the motor housing in the drum as not to damage the o-ring.

b. Align the capscrew mounting holes of the bearing carrier flange with those of the drum flange. This can be done through the access hole in the back surface of the motor housing. Coat capscrews with John Crane number 2 seal. Insert capscrews and torque per specifications (see figure 7-89). Torque C350B cap- screws to 130 ft.-lbs. (17.98 kg-m).

a. Position the drum directly behind the unit and lift or roll the drum into the frame until the drum is aligned with the large holes in the frame (see figure 7-90).

b. Rotate the motor housing in the drum until the access hole in the back wall of the housing is at its highest extreme. Position motor housing pilot flange so it will fit into the frame (see figure 7-91).

c. Align the frame to motor housing capscrew holes and insert the capscrews. Tighten the capscrews in an alternate pattern back and forth across the motor housing. Turn these capscrews only 1/4 to 1/2 turn at a time until the motor housing is piloted into and bottomed against the frame (see figure 7-92).

7-203. INSTALLATION OF DRIVE DRUM.

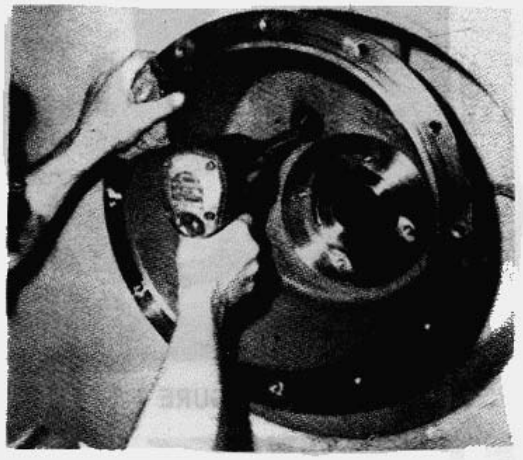

FIGURE 7-89.

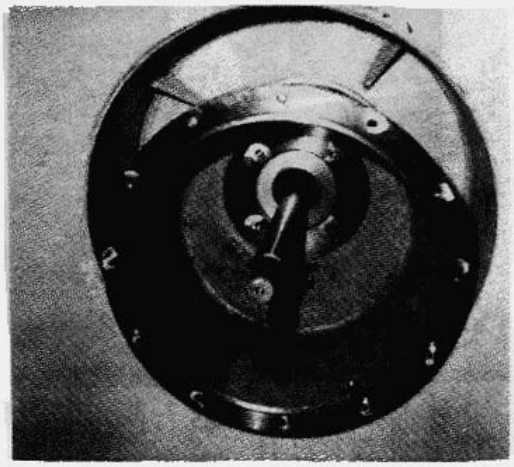

FIGURE 7-91.

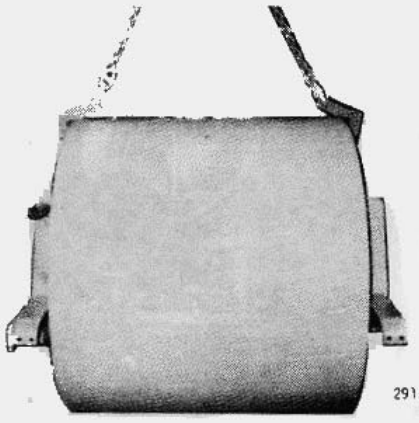

FIGURE 7-90.

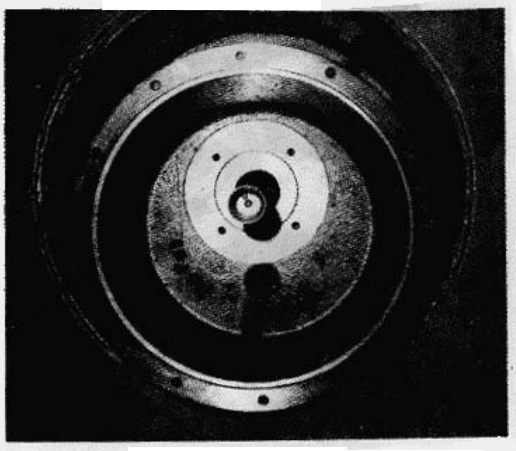

FIGURE 7-92.

NOTE: The frame-motor housing capscrews will turn hard as the drum is being pulled into position by these cap- screws. Torque the capscrews per specification. Install the drive shaft.

d. Install snap ring on brake shaft (C350B only) (see figure 7-93).

e. Turn the drive shaft from the motor housing end until the oil holes in the outer planetary hub are horizontal with the floor and above center (C350B only) (see figure 7-94).

f. Install scraper bar and bumper assembly if removed during disassembly.

g. Install two alignment bolts and spline the planetary anchor flange on to the outer planetary hub (C350B only) (see figure 7-95). Install two capscrews in two remaining holes and torque to 120 ft.lbs. (C350B only) (16.6 kg-m).

NOTE: The alignment mark on the anchor flange should be aligned to the alignment mark on the planetary hub (C350B only).

h. Insert three equally spaced capscrews. Torque these capscrews to 15 ft.-lbs. (2.074 kg-m) and then remove them (see figure 7-96).

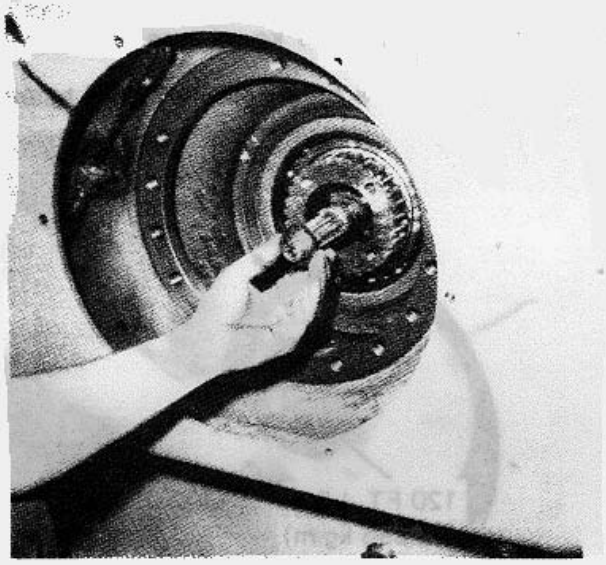

FIGURE 7-93.

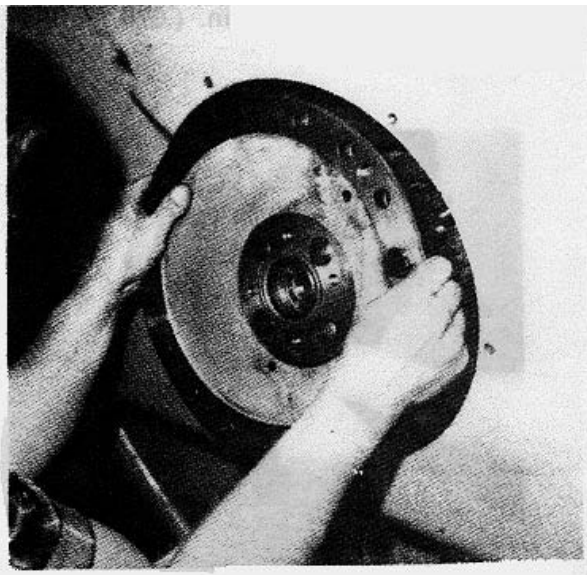

FIGURE 7-95.

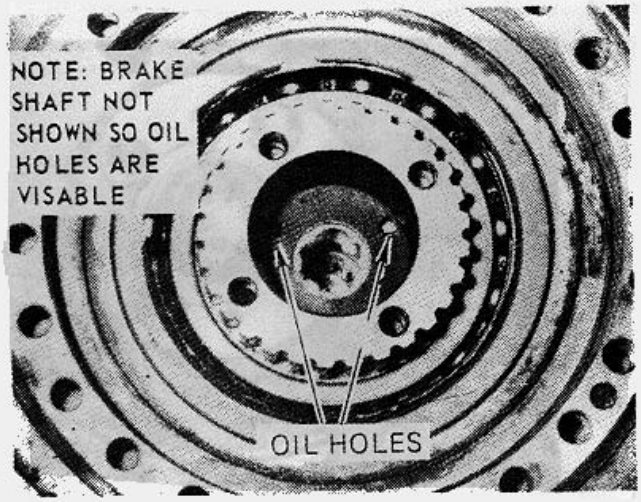

FIGURE 7-94.

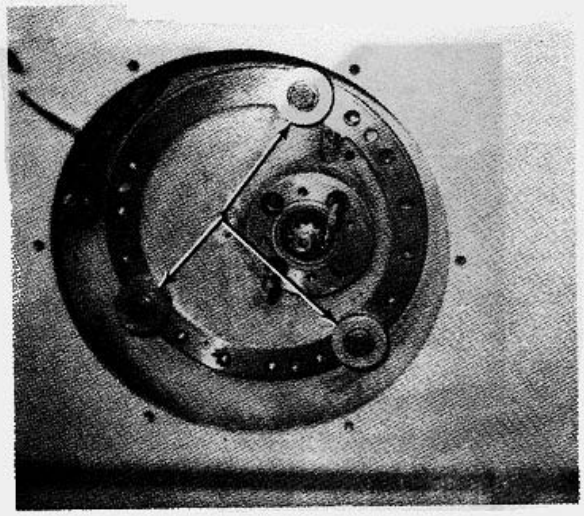

FIGURE 7-96.

i. Measure the distance between the frame and the planetary anchor flange. Take this measurement in three equally spaced locations. The best method of measurement is to use a depth micrometer and measure the depth from the outside of the flange through the puller bolt holes to the machined face of the frame. Total the three measurements taken and record them. Remove the anchor flange by using three puller capscrews (see figure 7-97). With a micrometer, measure the thickness of the flange next to the puller holes. Total the three measurements taken and subtract from the depth measurement. Divide your answer by three to obtain the shim thickness needed. For the C350B assemble a shim pack equal to the final answer plus .003 in. (.076 mm) or minus .002 in. (.051 mm).

j. Insert a shim pack equal (or as close as possible with available shims) to the measured distance in step i. Be sure marks are aligned as in step g (C350B only) (see figure 7-98).

CAUTION: The mating surface of the frame, shims, and planetary anchor flange must be cleaned with solvent and dried with compressed air. Any lubricant on -these surfaces could cause the planetary anchor flange to work back and forth.

k. Install the four planetary-to-anchor flange capscrews and torque to 120 ft.-lbs. (16.6 kg-m) (C350B only). Insert all of the frame-to-anchor flange capscrews and torque to 200 ft.-lbs. (27.7 kg-m) (see figure 7-99).

I. Pump the brake shaft support bearing full

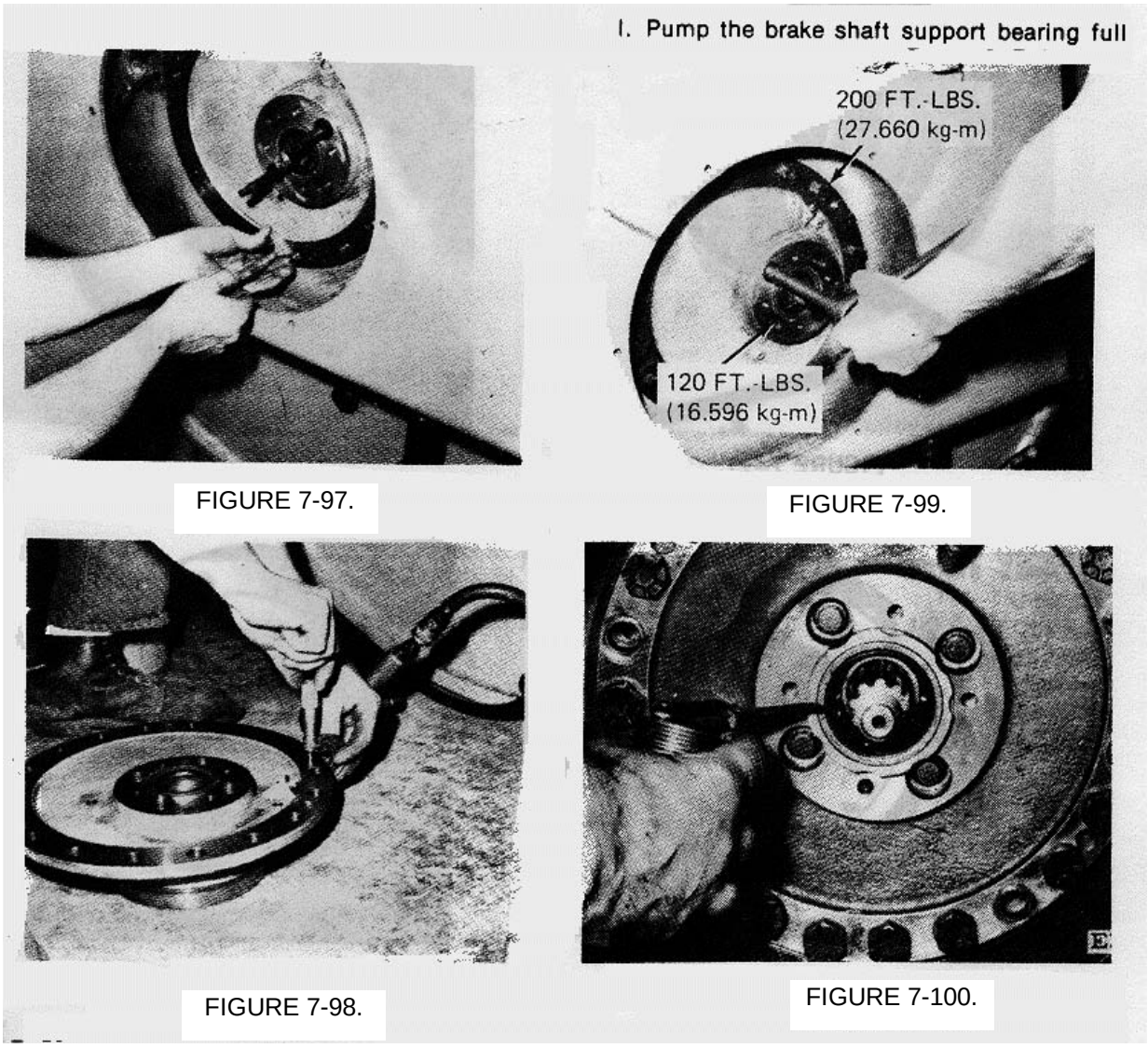

FIGURE 7-97.

FIGURE 7-99.

FIGURE 7-98.

FIGURE 7-100.

of oil (C350B only). Reassemble the brake (refer to Section 10) (see figure 7-100).

m. Fill final drive with lubricant (refer to Section 4).

n. Install the hydrostatic pump and motor.

o. Replenish transmission lubricant supply (refer to Section 4).

p. Follow transmission start-up procedure before returning unit to service.

7-204. INSTALLATION OF HYDROSTATIC MOTOR.

7-205. Install the hydrostatic motor by reversing the procedure presented in paragraph 179. Note the following:

a. The motor mounting surface should be coated with a plastic sealer.

b. Torque the motor mounting bolts to 75 ft.-lbs. (10.4 kg-m).

c. Torque the high-pressure lines to 35 ft.-lbs. (4.8 kg-m). Connect by-pass valve linkage.

d. After installation the transmission start-up procedure must be completed before returning the unit to service.

7-206. HYDROSTATIC PUMP INSTALLATION.

7-207. Install the hydrostatic pump by reversing the procedures presented in paragraph 7-178. Take note of the following:

a. Torque pump mounting capscrews to 75 ft.-lbs. (10.4 kg-m).

b. Torque high-pressure line capscrews to 35 ft.-lbs. (4.8 kg-m).

CAUTION: Follow transmission start-up procedure before returning unit to service.

7-208. CLEANING THE HYDRAULIC SYSTEM.

CAUTION: The importance of cleaning the entire hydraulic system after any component failure cannot be over- emphasized. If a failure occurs in either the hydrostatic drive system or the steering circuit, the entire hydraulic system should be disassembled and cleaned.

7-209. Removal and disassembly of the following list of components is required when any system component fails. Inspect each component for damage and rebuild or replace as required.

a. Steering pump.

b. Steering cylinder.

c. Steering control unit.

NOTE: Matching of mating parts is critical.

d. Cooler by-pass valve.

e. Hydraulic tank.

f. Transmission displacement control valve.

g. Transmission servo cylinders.

h. All hoses.

NOTE: Replace the oil filter with a Hyster approved 10 micron filter only. It is recommended after overhaul that the oil filter be replaced at 50 hours after start- up before returning to normal maintenance cycle.

7-210. Refill the hydraulic system with oil per specifications (see Section 2).

7-211. Precharge the hydraulic system as follows:

a. Disconnect the case drain hose at the pump.

b. Fill pump and motor cases with specified oil (see Section 2).

c. Loosen the end of the suction hose at the charge pump. If hydraulic oil is not present, pressurize the tank to a maximum of 10 PSI (0.7 kglcm2).

d. Retighten hose fittings when oil appears.

e. Complete the transmission start-up procedure.

NOTE: Partial cleaning of the system is ineffective. Any contamination left in the system may cause a repeat failure.

CAUTION: Oil **MUST** be at the charge pump before engine is started.

7-212. SUNDSTRAND TRANSMISSION START-UP PROCEDURE.

a. Block the drive drum safely off the ground.

b. After the transmission has been installed, remove the threaded plug from the top of the main pump housing (see figure 7-101). Install a 600 PSI (42.19 kg/cm2) pressure gauge with a short section of hose. The port is 7/16 x 20 straight thread with o-ring. Low charge pressure may be checked at the motor case port as shown in figure 7-102.

c. Check all fittings to be sure that they are tight.

d. Fill the pump and motor cases through the upper case drain openings with specified oil (see Section 2). All fluid should be passed through a 10 micron filter. Reinstall and tighten case drain line.

e. Loosen the charge pump line, coming from the filter/reservoir (see figure 7-103).

f. Fill the reservoir and hoses with specified oil (see Section 2). Install and tighten the hoses (see figure 7-103).

WARNING: Disconnect the push-pull cable from the pump until after Initial start-up. This will allow the pump to remain in neutral (see figure 7-104).

g. Pull out the engine coil wire or close the

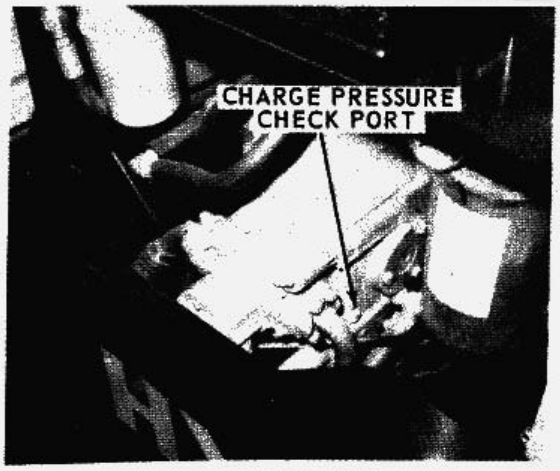

FIGURE 7-101.

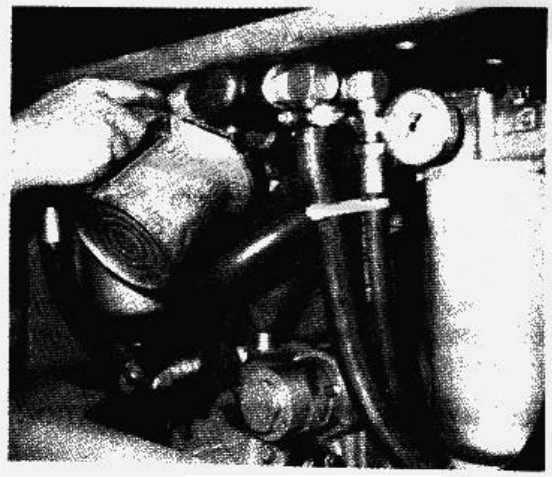

FIGURE 7-103.

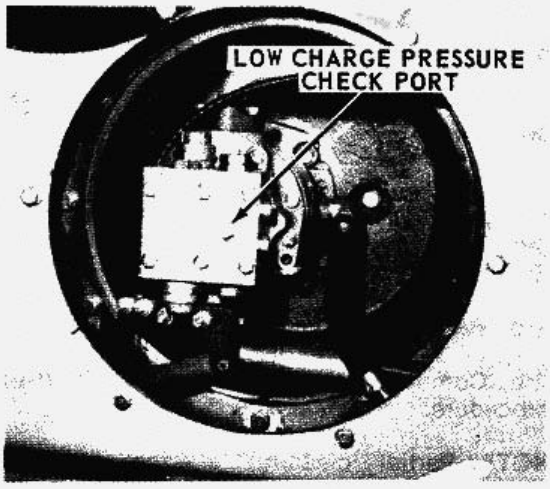

FIGURE 7-102.

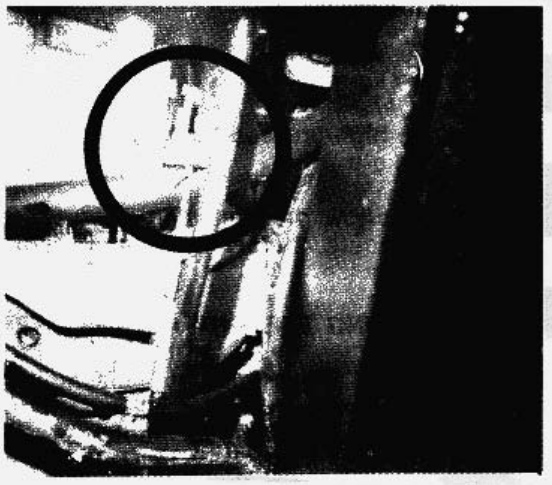

FIGURE 7-104.

injector rack and turn the engine over until charge pressure reaches 30 PSI (2.1 kg cm2) or more.

h. Start the engine and maintain a 750 RPM speed for five (5) minutes. This will allow the system to fill properly. Pressure surges may be observed on pressure gauge - this is normal while running at 750 RPM, the charge pressure must be at least 100 PSI (7.0 kg/cm2) above case pressure. If it is not, shut down and troubleshoot (see Section 5).

i. Increase speed to 1000 RPM; charge pressure should be 190-220 PSI (13.4-15.5 kg/cm2) above pump case pressure.

j. Shut down the engine and reconnect the push-pull cable to the pump linkage.

k. Check oil level in reservoir. Fill if necessary.

I. Restart engine and run at 1500 to 1800 RPM. Charge pressure should be 190-220 PSI (13.4-15.5 kg/cm$^{2)}$ above pump case pressure.

m. Move Direction-Throttle Control Bail slowly to the forward and then to the reverse position. Charge pressure will drop to 160-180 PSI (11.2-12.7 kg/cm2) above pump case pressure. Repeat cycle for five minutes.

CAUTION: Should the charge pressure drop below 100 PSI (7.0 kg/cm2) above pump case pressure at any time, discontinue start-up until trouble has been determined.

n. Run engine at maximum RPM with the pump in neutral. Observe the reading of the suction filter vacuum gauge located on the filter. This gauge should be reading NORMAL.

o. Shut down engine, remove all gauges and replace all lines and plugs. Check reservoir oil level and tighten oil fill cap.

p. Machine is now ready for operation.

7-213. BY-PASS VALVE.

7-214. Refer to Section 3, paragraph 3-29 for a complete explanation of the by-pass valve and its function.

7-215. BY-PASS CONTROL ADJUSTMENT.

a. Adjust wire stop on control cable for 1/8 - 114 in. (3.2-6.4 mm) free play (see figure

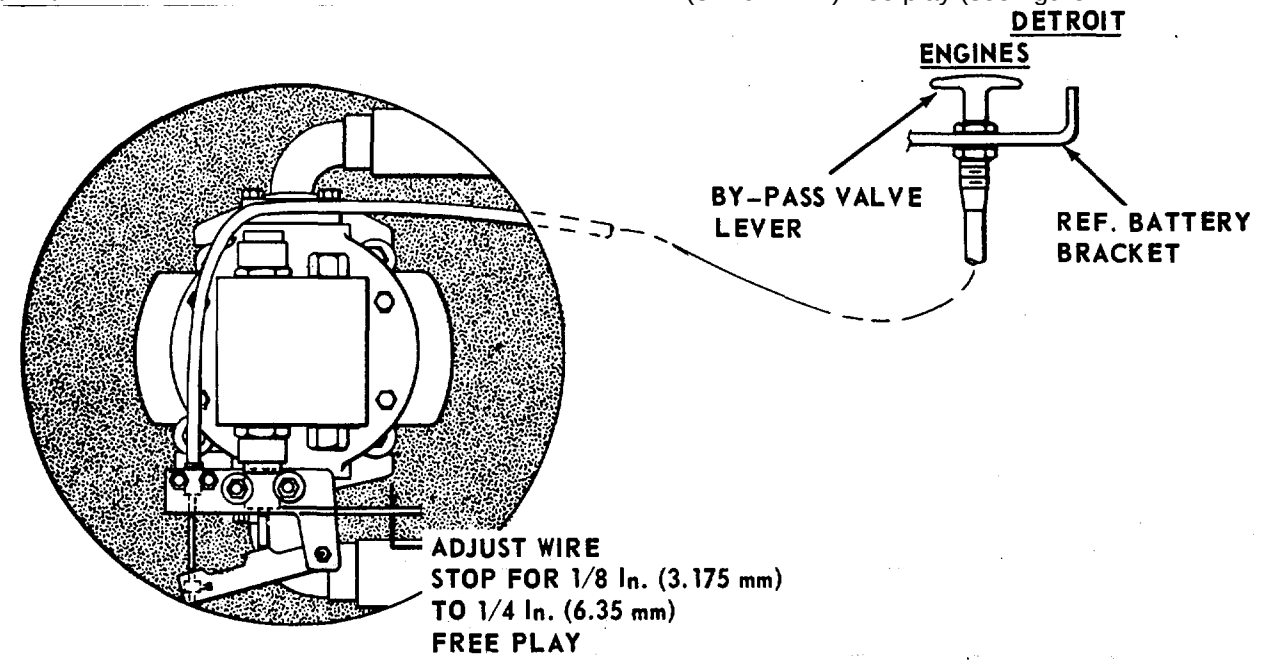

FIGURE 7-105.

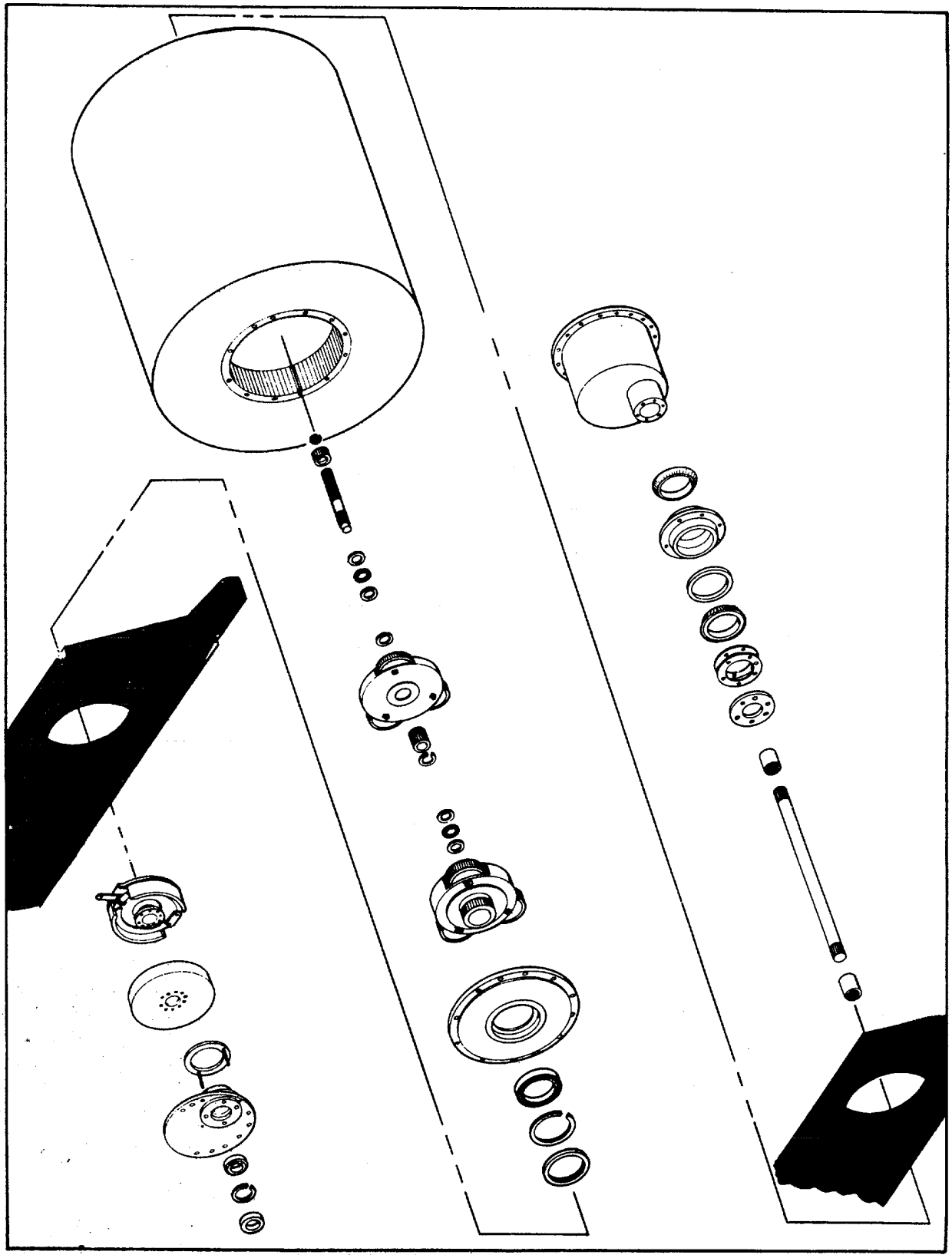

FIGURE 8-1.

8-1. GENERAL.

8-2. This section contains a description of the final drive operation and overhaul instructions for components of the drive drum assembly. Overhaul instructions include removal, dis- assemly, inspection, reassembly and installa- tion of all components of the final drive assembly. Design specifications are given in Section 2. Troubleshooting instructions are given in Section 5.

8-4. C350B FINAL DRIVE DESCRIPTION (see figure 8-2).

8-5. The final drive consists of an internal, double reduction planetary system located within the left side of the single drive drum (see figure 8-1). Torque is transferred from the hydraulic motor (across the drum) to the planetary system by the drive shaft (A). A sun gear (B) Is splined to this shaft and drives the smaller of the two planetary gear sets (C) in the opposite direction. This gear set (C), in turn, attempts to turn the ring gear (D) (bolted directly to the drive drum) in the same direction gear set (C) is traveling, but does not possess the mechanical advantage to do so.

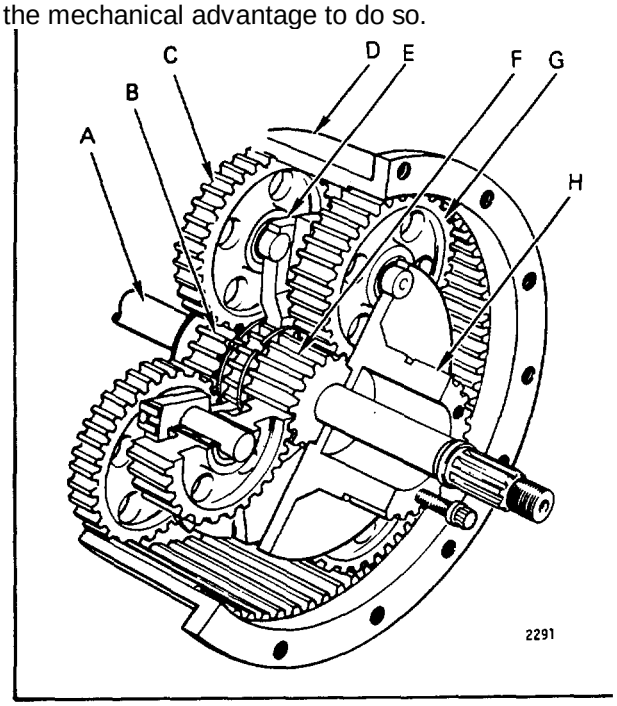

FIGURE 8-2.

Consequently, the small planet carrier (E) (non-stationary) walks around the ring gear (D). Planet carrier (E) is splined to and drives a second sun gear (F) which rotates in the same direction as, but independently of, sun gear (B). Sun gear (F) then drives the larger planetary gear set (G) which is capable of turning the ring gear (D) and the drive drum. (Ring gear (D) is attached to the drum.) The second larger planet carrier (H) is bolted to the frame, and provides the reaction necessary to drive the drum.

8-6. REMOVAL AND DISASSEMBLY OF FINAL DRIVE ASSEMBLY.

a. Drain the lubricant (refer to Section 4).

NOTE: Inspect the lubricant for foreign particles. Keep samples for failure analysis.

b. Block the guide rolls front and rear.

WARNING: Do not depend on the parking brake to prevent the unit from moving. The brake assembly will be removed prior to the removal of the drive drum.

c. Jack up both sides of the frame so that the weight of the frame is on the jacks and not the drive drum.

d. Remove the scraper bar and bumper assembly mounting capscrews and lift off the assembly.

e. Complete the DRIVE DRUM removal procedure presented in Section 7, paragraph 7-1 98.

f. Remove the capscrews in the drum hub. Pull the hub using the puller holes provided and appropriate puller bolts. jnstall two dowl (guide) pins (see figure 8-3).

WARNING: Connect the drum hub to a hoist prior to complete removal from the drive drum. The outer planetary assembly will accompany the drum hub upon removal. Care should be taken when handling these components.

g. Remove the inner planetary assembly (see figure 8-4).

h. Remove the brake shaft snap ring. Then pull the inner sun gear, small thrust washers

and needle thrust bearing from inner planetary assembly to prevent their loss or damage (see figure 8-5).

i. Inspect ring gear for wear, damage, cracked teeth or any other signs of impending failure. Use the puller holes provided to remove ring gear if replacement or repair is necessary (see figure 8-6).

j. Seal off drive shaft hole and steam clean planetary gear case in the drive drum. make sure pockets and corners are cleaned thoroughly.

k. Remove the planetary anchor flange oil seal for replacement. Remove snap ring, dust protector and bearing if it is worn or damaged (see figure 8-7).

I. Inspect the interlocked sun gear for excessive wear on both of its thrust surfaces (one located at each end) and twisted or cracked splines or any other signs of impending failure. Remove if necessary by removing snap ring from inside of the carrier and lift out the gear (see figure 8-8).

FIGURE 8-3

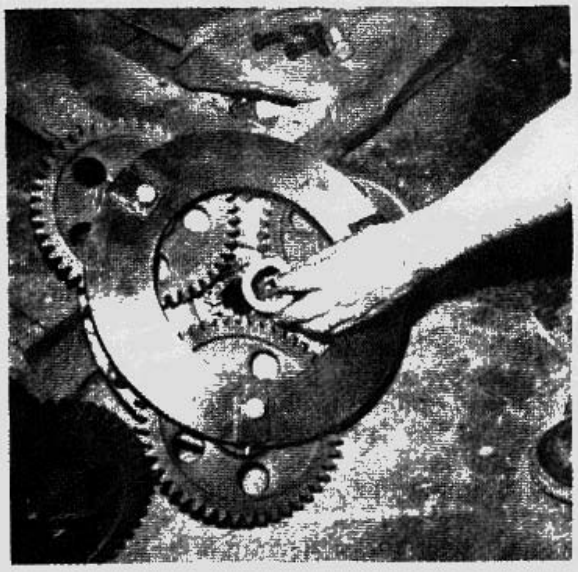

FIGURE 8-5

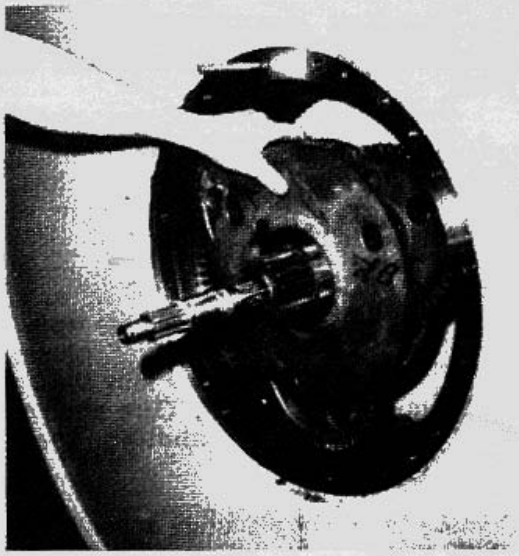

FIGURE 8-4

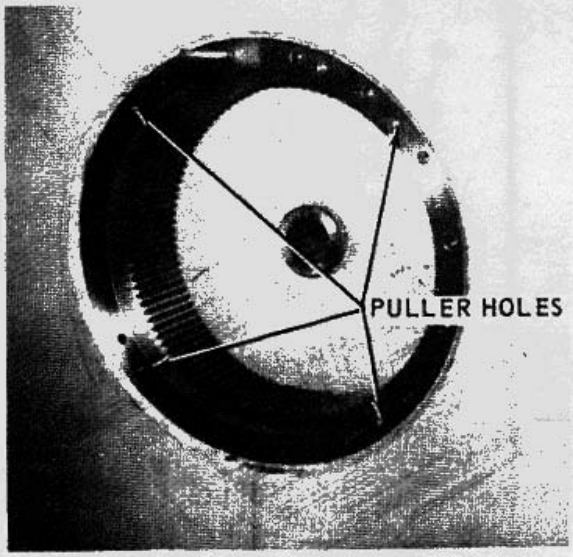

FIGURE 8-6

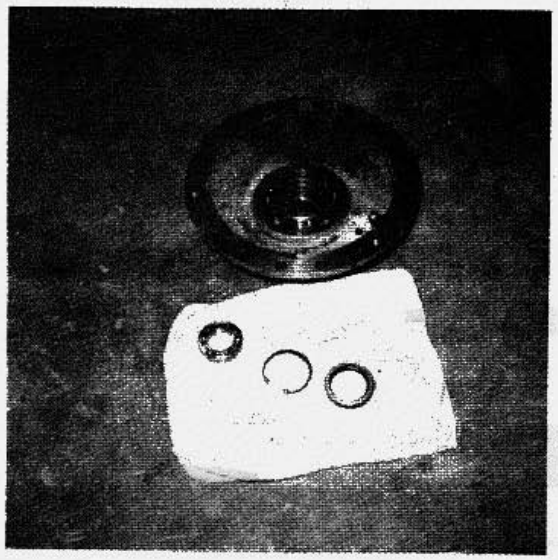

FIGURE 8-7

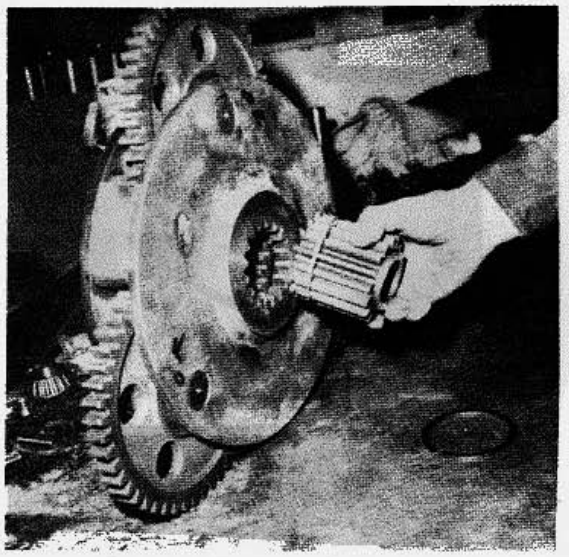

FIGURE 8-8

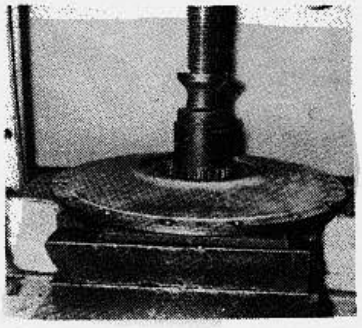

FIGURE 8-9

m. Press outer planetary assembly out of the drive drum hub using an arbor press (see figure 8-9).

CAUTION: The drum hub must be supported in three equally spaced points when pressing out the outer planetary assembly to prevent damage to the drum hub.

n. Disassembly of drive drum hub. Remove the oil seal for replacement. Check that companion flange seal surface is smooth (see figure 8-10).

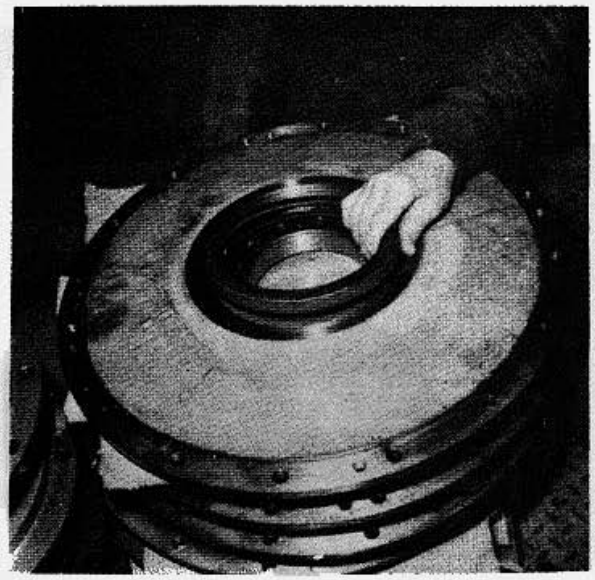

FIGURE 8-10

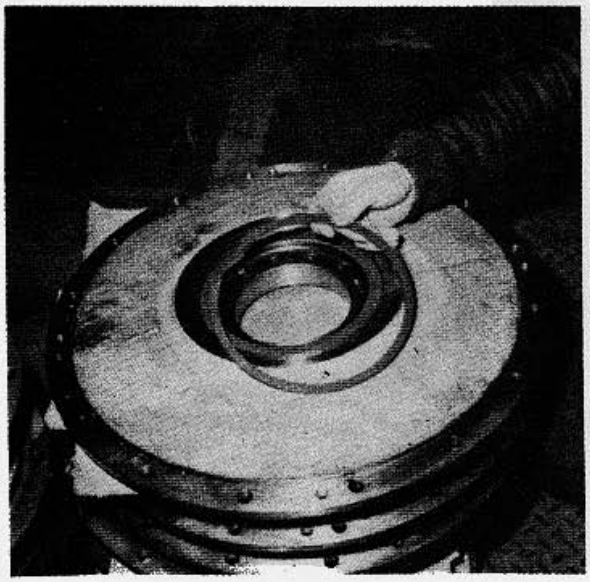

FIGURE 8-11

o. Pry out the snap ring with a large screwdriver or medium size pry bar; Replace if worn or scored (see figure 8-11).

p. Turn the drum hub over and place it in an arbor press. Using an appropriate size pusher, press out the large bearing (see figure 8-12).

q. Place the inner planetary assembly on a protected surface with the interlocked sun gear down.

r. Clean the webbed portion of each of the three planetary pinion gear and mark their position with respect to the planetary carrier (see figure 8-13).

NOTE: Since the planetary pinions are extremely hard, a punch is not effective. To mark these planetary pinions, paint a small portion of each gear with a light color paint and etch either 1, 2, or 3 on each gear.

NOTE: The planetary carrier can be marked correspondingly with a punch.

s. With the planetary pinion gears and carrier properly marked, unlock and remove one pinion gear capscrew, lockplate and spacer (see figure 8-14).

t. Push the pinion gear riding pin out of the

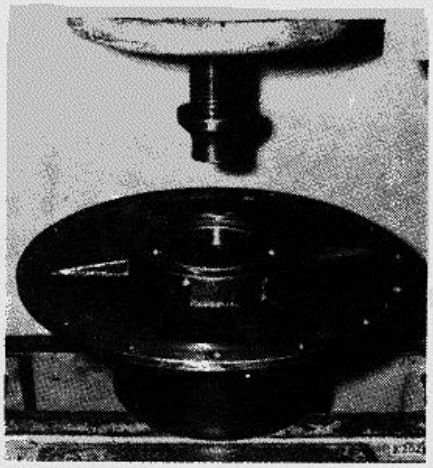

FIGURE 8-12

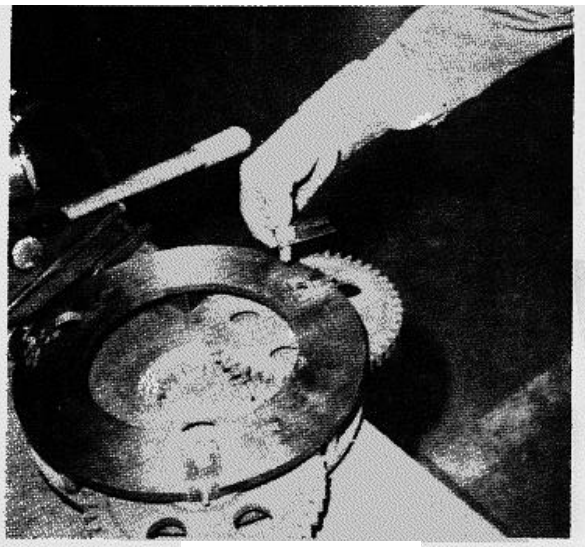

FIGURE 8-14

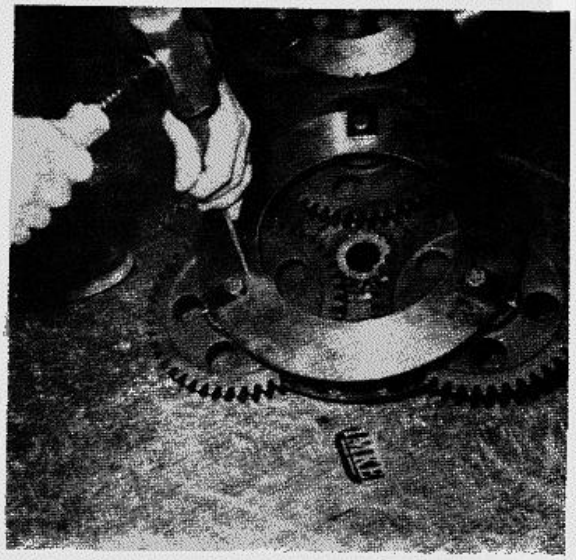

FIGURE 8-13

FIGURE 8-15

carrier and gear. Lift out planetary pinion gear, thrust washers, and bearings (see figure 8-15).

CAUTION: The bearing cones will fall out of the pinion gear as soon as they are free to do so. Keep each cone with its respective cup by tying them in position in the pinion gears. Remove the other two, pinion gears from the carrier using the same procedure. Keep each gear and its associated parts separate. Do not mix component parts.

u. Inspect each bearing cup and cone, including those not removed from the pinion gears, and replace if rollers or cups are worn, pitted or damaged in any way. Remove parts needing replacement (see figure 8-16).

v. Remove bearing cups from planetary pinion with a small soft punch and hammer.

NOTE: A snap ring separates and locates the two cups in each pinion gear. Remove the lower cup only, i.e., the pinion must be turned over once to remove both cups (see figure 8-17).

w. Remove the snap ring with a screwdriver or a small pry bar and inspect for chipping or wear. Replace if necessary (see figure 8-18).

x. Place the outer planetary assembly on a protective surface with the large splined hub upward. Follow steps q through w of the inner planetary disassembly procedure.

8-7. CLEANING AND INSPECTION.

8-8. All gears (including both sun gears), carrier, pins, plates, and capscrews should be cleaned in solvent. Inspect each gear for galling, nicking, chipping and cracking, especially at the root of each tooth.

8-9. All bearings should be washed in fresh solvent. Agitate in the solvent; do not use a brush as some of the bristles may break off and lodge in the bearing. Blow

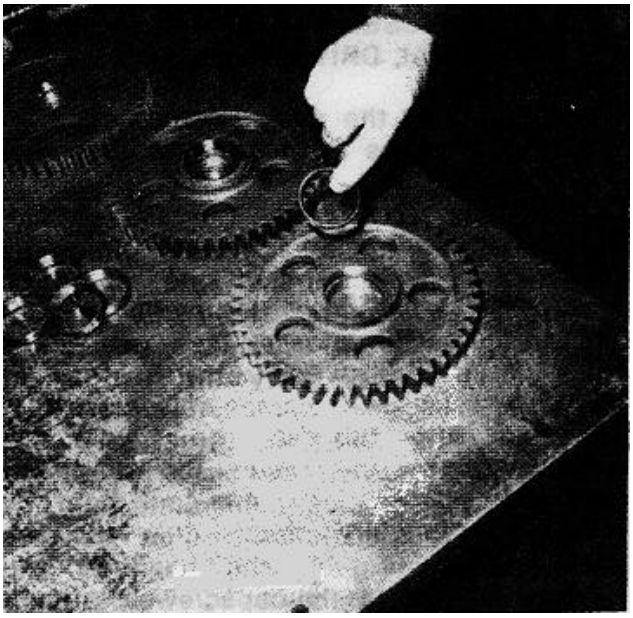

FIGURE 8-17.

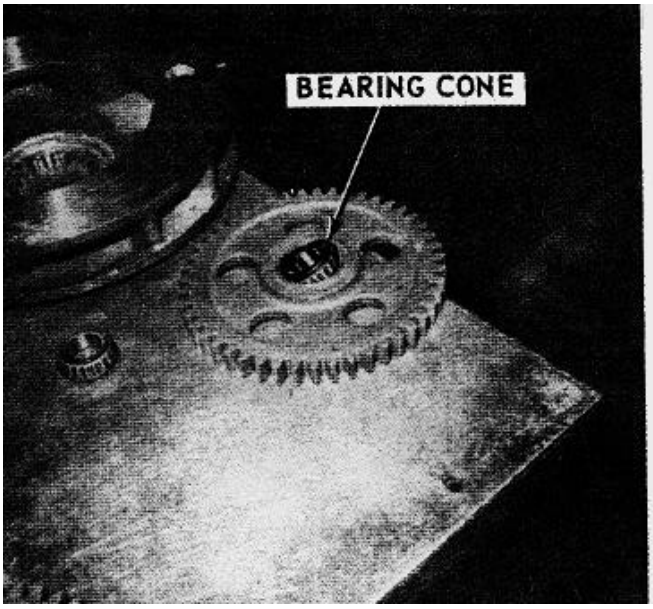

FIGURE 8-16.

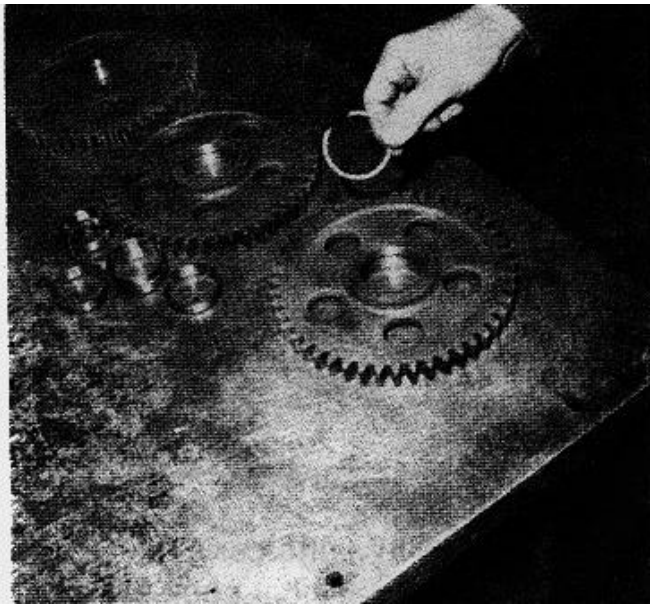

FIGURE 8-18.

bearing completely dry, do not spin, with compressed air. Oil bearing with light oil and rotate several times by hand. Discard bearing if rotation is not free of binding and clicking. Compare bearing looseness with a new one. Discard the bearing if there is a considerable difference. The bearing cages must be tight and the bearings free of defects. Wrap bearings in clean paper if they are not to be installed immediately.

8-10. Discard all seals, snap rings and thrust washers that are worn or scored.

8-11. REASSEMBLY AND INSTALLATION OF FINAL DRIVE ASSEMBLY.

a. Install the snap ring, bearing cups, and bearing cones in each pinion gear (see figure 8-20).

b. Matching the marks on the pinion gear and planetary carrier install one pinion gear into the planetary carrier (long hub on pinion gear away from interlocked sun gear). Place thrust washer between pinion gear and planetary carrier on the capscrew side of the pinion gear. Align the gear, thrust washer and planetary carrier and insert the riding pin. Install the spacer, lockplate and capscrew. Rotate the planetary pinion gear to insure proper seating of the bearings and thrust washer. Torque the capscrews per specification back off one flat and lock. Then install the other two pinion gears in the same manner (see figure 8-21).

c. Assembly of Outer Planetary Assembly. Place the outer planetary assembly on a protective surface with the large splined hub upward. Note that the outer planetary pinions do not have a longer hub as do the inner planetary pinions. The outer planetary pinions are symmetrical and can be installed correctly with either side towards the splined hub (see figure 8-22).

d. Install the snap ring, bearing cups, and bearing cones in each pinion gear. Place thrust washer between pinion gear and planetary carrier on the capscrew side of

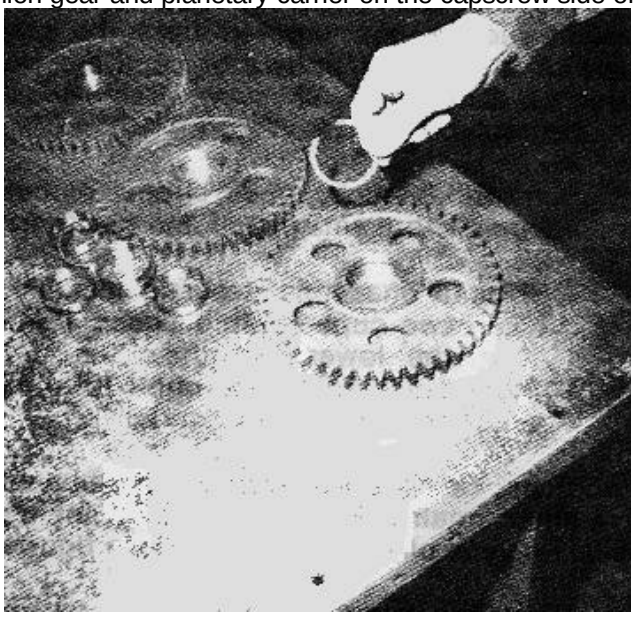

FIGURE 8-20A.

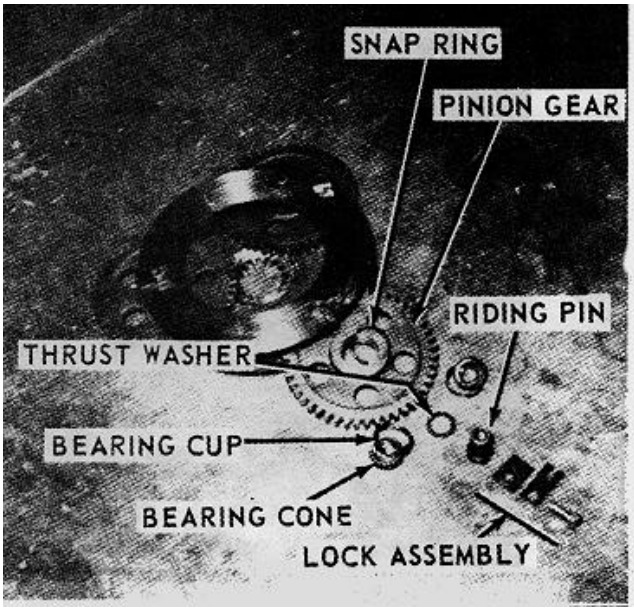

FIGURE 8-19.

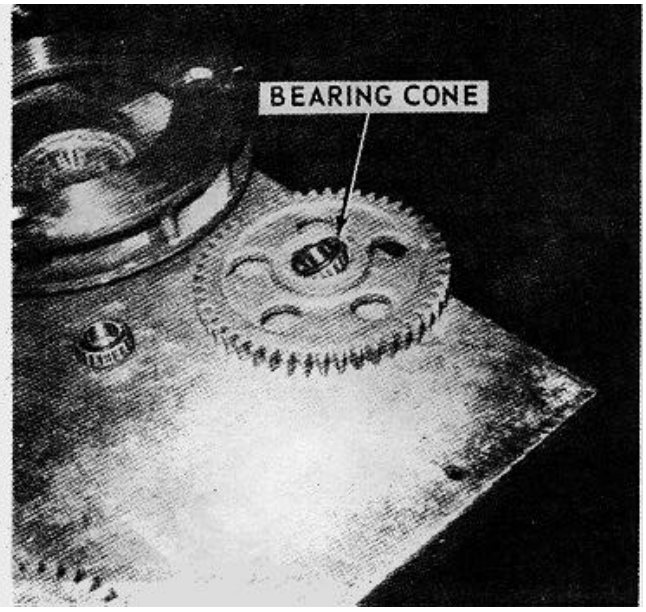

FIGURE 8-20B.

the pinion gear (see figure 8-23).

e. Align the gear, thrust washer and planetary carrier and insert the riding pin. Install the spacer, lockplate and capscrew. Rotate the planetary pinion gear to insure proper seating of the bearings and thrust washer. Torque the capscrew per specification, back off one flat and lock. Then install the other two pinion gears in the same manner (see figure 8-24).

f. Place the planetary anchor flange on a protective surface with the oil breather side up. Press the bearing into the flange and install the snap ring. Press the oil seal into the flange until the seal bottoms on the shoulder provided (see figure 8-25). Install dust protector onto anchor flange and tighten dust protector mounting bolts.

g. Assembly of drive drum hub. Press the bearing into the drum hub (see figure 8-26).

FIGURE 8-21.

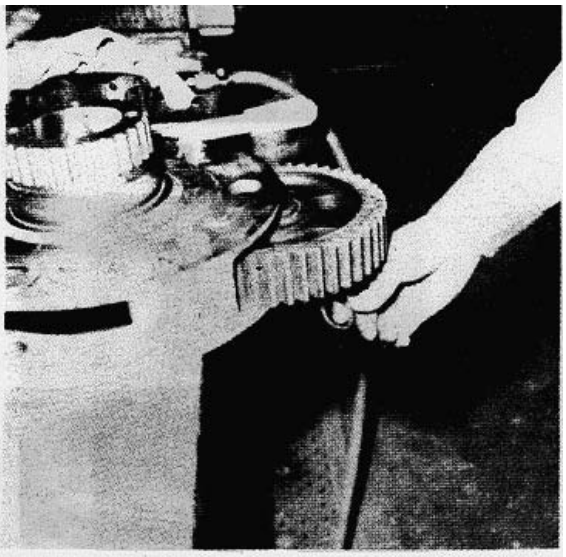

FIGURE 8-23.

FIGURE 8-22.

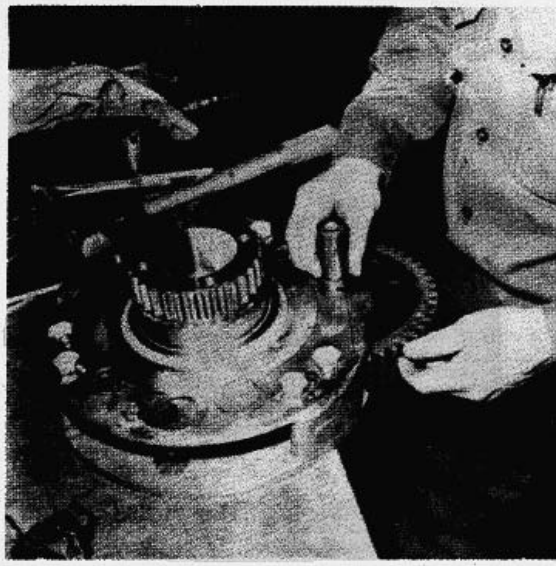

FIGURE 8-24.

FIGURE 8-25.

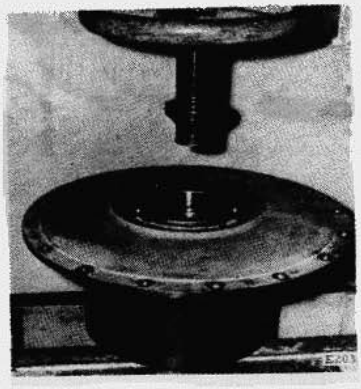

FIGURE 8-26.

FIGURE 8-27.

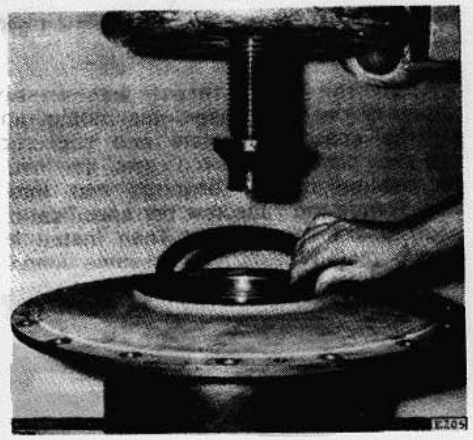

FIGURE 8-28.

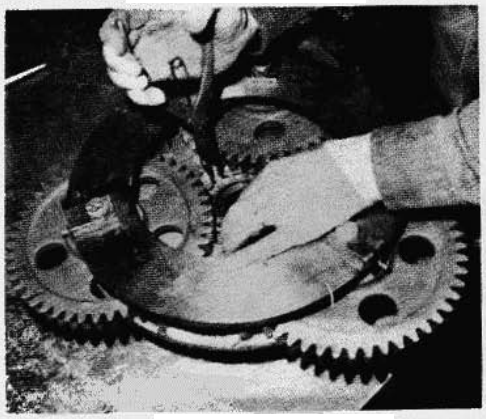

FIGURE 8-29.

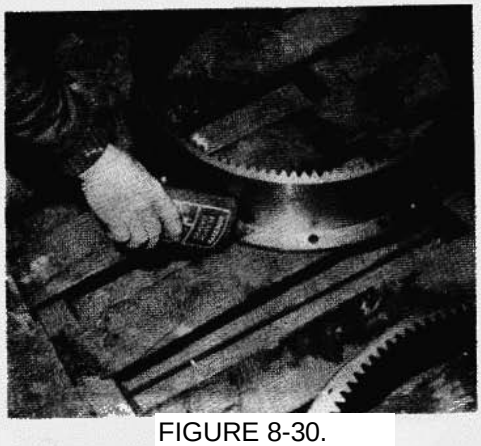

FIGURE 8-30.

h. Install the large snap ring (see figure 8-27).

i. Press the oil seal into the drum hub until it bottoms against the snap ring (see figure 8-28).

j. Assembly of Inner Planetary Assembly. Install the interlocking sun gear in planetary carrier and lock it in place with the snap rings. Place the planetary carrier on a protective surface with the long hub of the interlocked sun gear down (see figure 8-29).

k. Installation of the Planetary System. If the ring gear has been removed, clean its mounting flange and paint it with "Loctite Plastic Gasket" or equivalent (see figure 8-30).

l. Do the same to the mating machined surface of the drum (see figure 8-31).

m. Install the ring gear using a pilot stud. Using four capscrews, seat the ring gear in the drum. Remove the four capscrews (see figure 8-32).

n. Insert thrust washer first, then needle thrust bearing into the machined pilot of the interlocked sun gear of the inner planetary assembly using a heavy machine grease to hold them in the pilot (see figure 8-33).

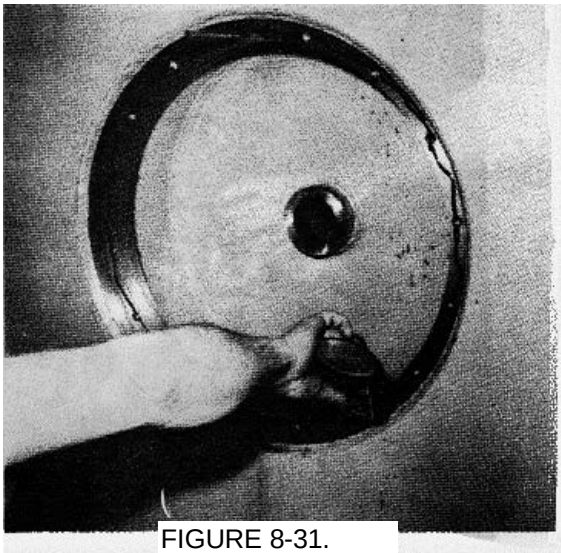

FIGURE 8-31.

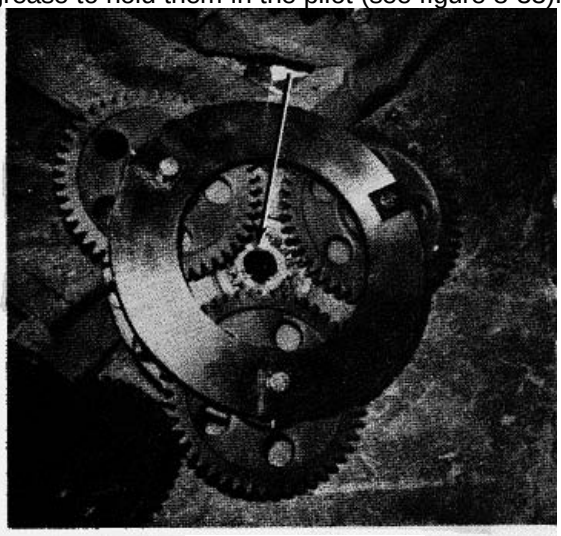

FIGURE 8-33.

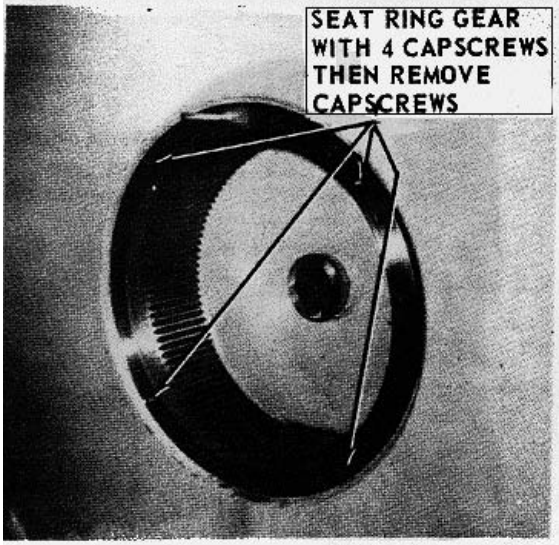

FIGURE 8-32.

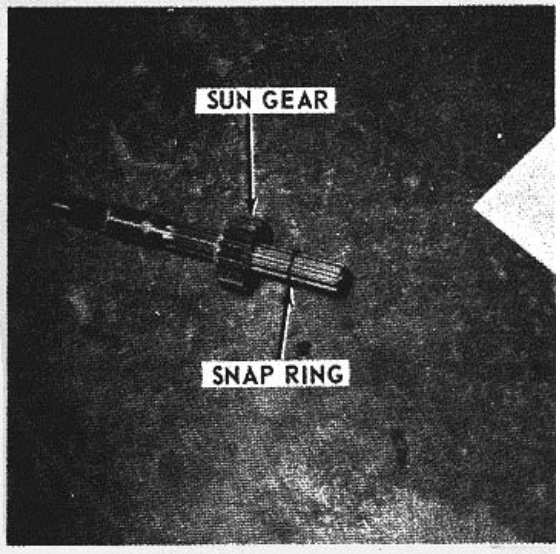

FIGURE 8-34.

o. Install the small sun gear on the brake shaft. Then install the snap ring into its retaining groove (see figure 8-34).

p. Assemble brake shaft into inner planetary gear (see figure 8-35).

q. Install inner planetary into ring gear (see figure 8-36).

r. Apply a large amount of lubriplate. Insert thrust washer first and then assemble needle bearing into outer planetary (see figure 8-37).

s. Lift the outer planetary assembly into the ring gear, meshing the planetary pinions with the ring gear, and push this assembly into the drum until it bottoms against the thrust washers (see figure 8-38).

NOTE: Check to see that the two planetary carriers do not touch. Also, check that the thrust needle bearings have not fallen out of place. Planetaries must be removed if these conditions are a problem.

t. Paint outer face of ring gear with "Locktite Plastic Gasket" or equivalent. Apply Lubriplate to machine boss of outer planetary (see figure 8-39).

FIGURE 8-35.

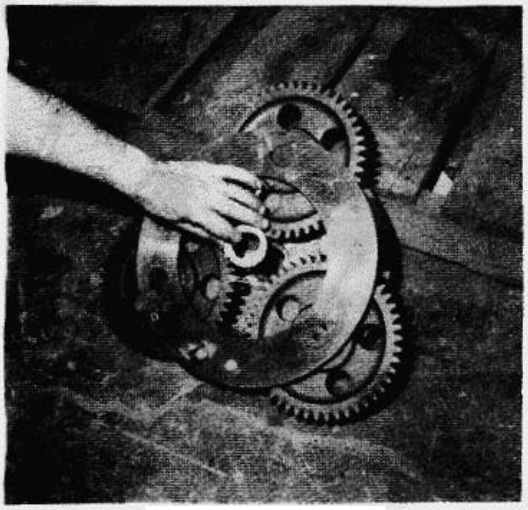

FIGURE 8-37.

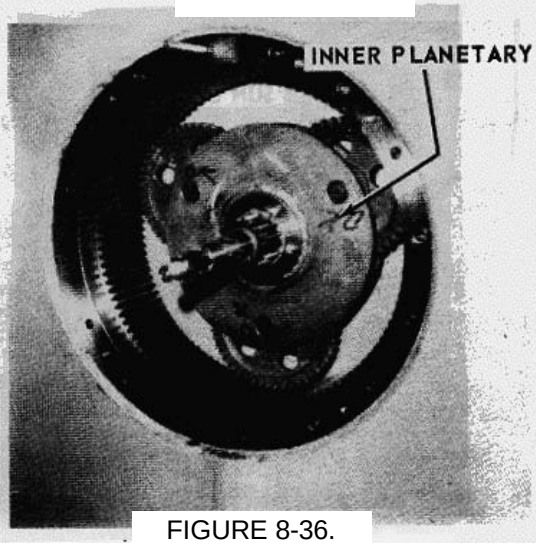

FIGURE 8-36.

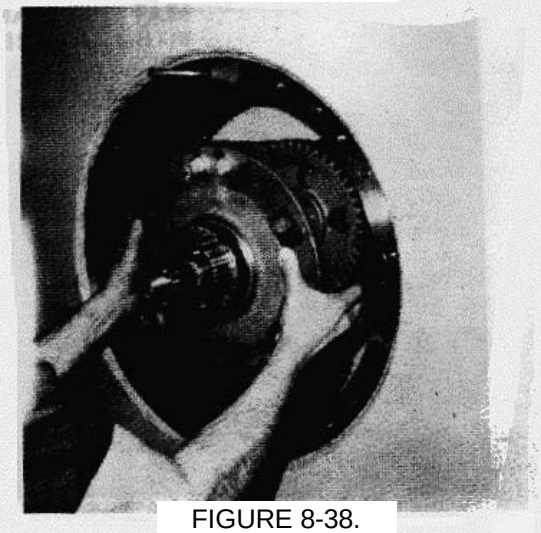

FIGURE 8-38.

u. Position drum hub loosely against drive wheel. Use three place bolts equally spaced to initially pull hub against ring gear (see figure 8-40).

CAUTION: Do not align puller holes of the drum with those of the ring gear.

v. Remove puller bolts and install the 16 drum hub capscrews. Torque in a circular pattern to specification (see figure 8-41).

w. Manufacture a puller per illustration in figure 8-42.

x. Assemble special puller onto splined gear. Tighten capscrews until splined gear is flush with bearing (see figure 8-43).

y. Install the drive drum following the procedure presented in Section 7, paragraph 7-203. Fill final drive with specified lubricant (refer to Section 4).

z. Install scraper bar and bumper assembly.

CAUTION: Follow transmission start-up procedure before returning unit to service.

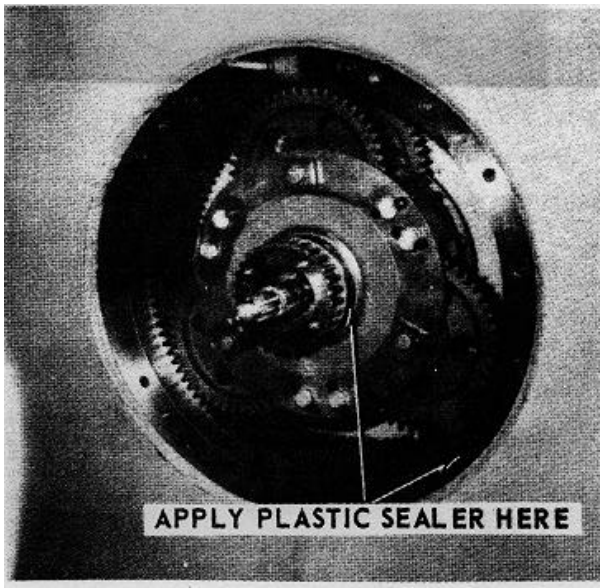

FIGURE 8-39.

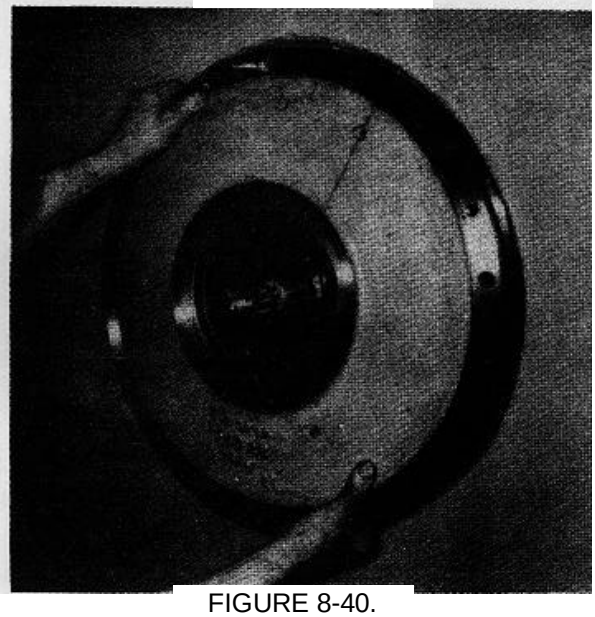

FIGURE 8-40.

FIGURE 8-41.

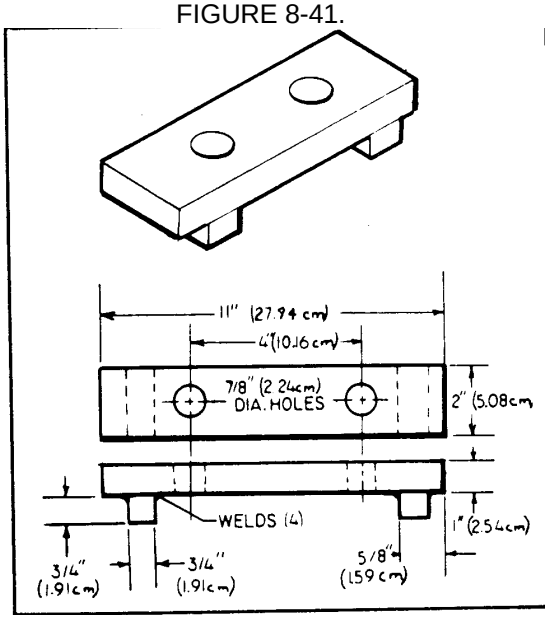

FIGURE 8-42.

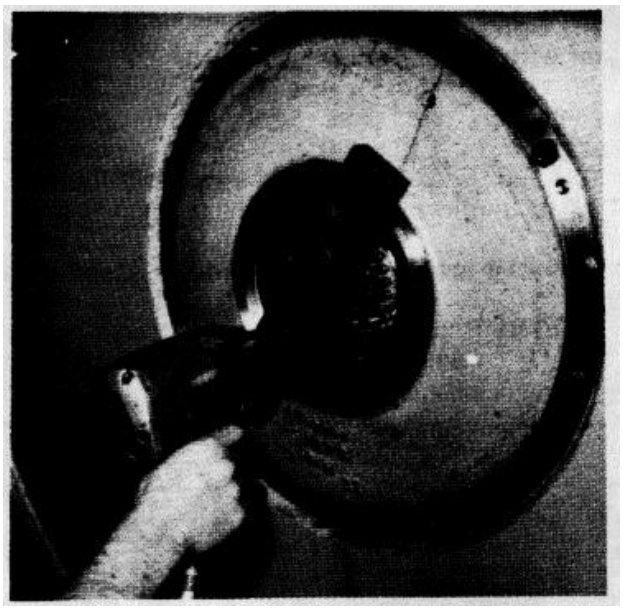

FIGURE 8-43A.

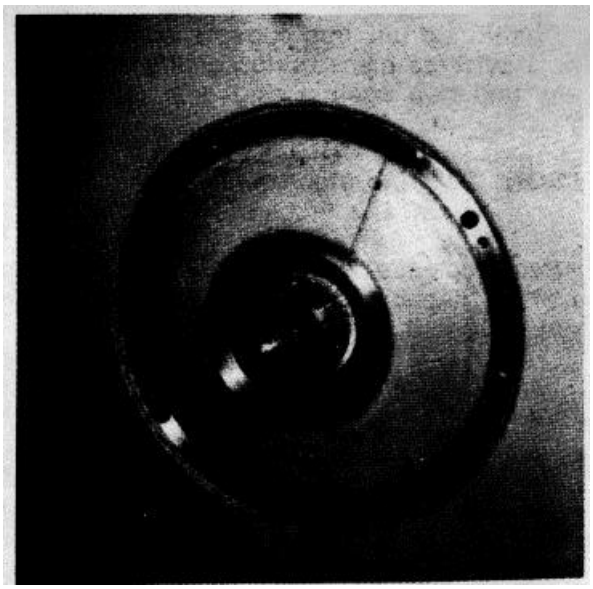

FIGURE 8-43B.

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9-1. GENERAL.

9-2. This section contains a description of the steering system operation and overhaul instructions for major components. Overhaul instructions include removal, disassembly, inspection, reassembly and installation procedures. System checks and adjustments are given at the end of steering cylinder repairs. Design and performance specifications are given in Section 2. Troubleshooting instructions are given in Section 5.

9-3. DESCRIPTION (see figure 9-1).

9-4. STEERING SYSTEM.

9-5. The steering system is a hydrostatic operated, manually controlled system with provisions for manual steering. The steering system has a natural feel for the operator by provide in a direct relation between the steering wheel position and the guide roll position.

9-6. Components of the steering system are:

(1) an engine mounted hydraulic power pump

(2) the gooseneck mounted power steering control unit

(3) double acting hydraulic steering cylinder

(4) steering wheel

(5) hydraulic fluid reservoir (common with the transmission hydraulic reservoir)

(6) hydraulic lines and fittings.

9-7. STEERING CONTROL UNIT.

9-8. DESCRIPTION (see figure 9-2).

9-9. The steering control unit is an open-center rotary actuated unit consisting of three major section:

(1) a column section

(2) control section

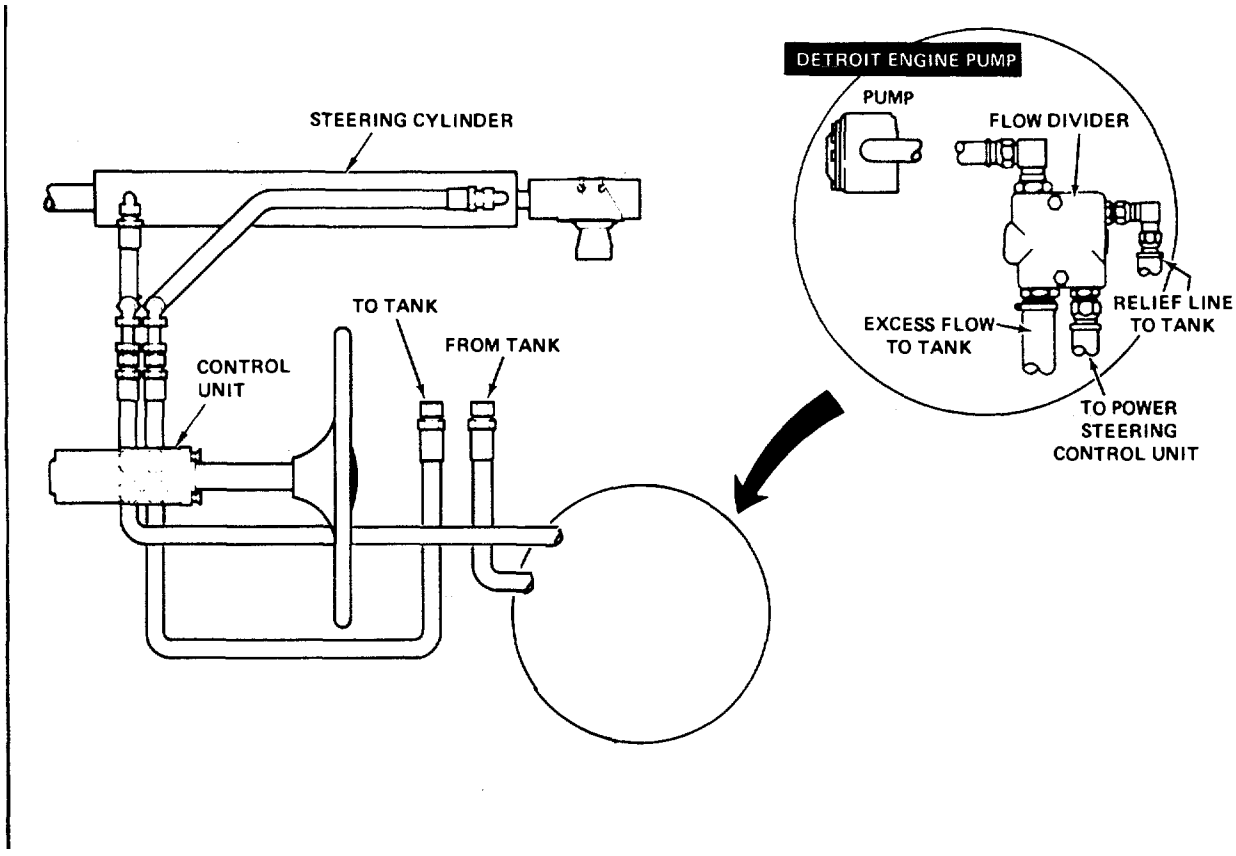

FIGURE 9-1.

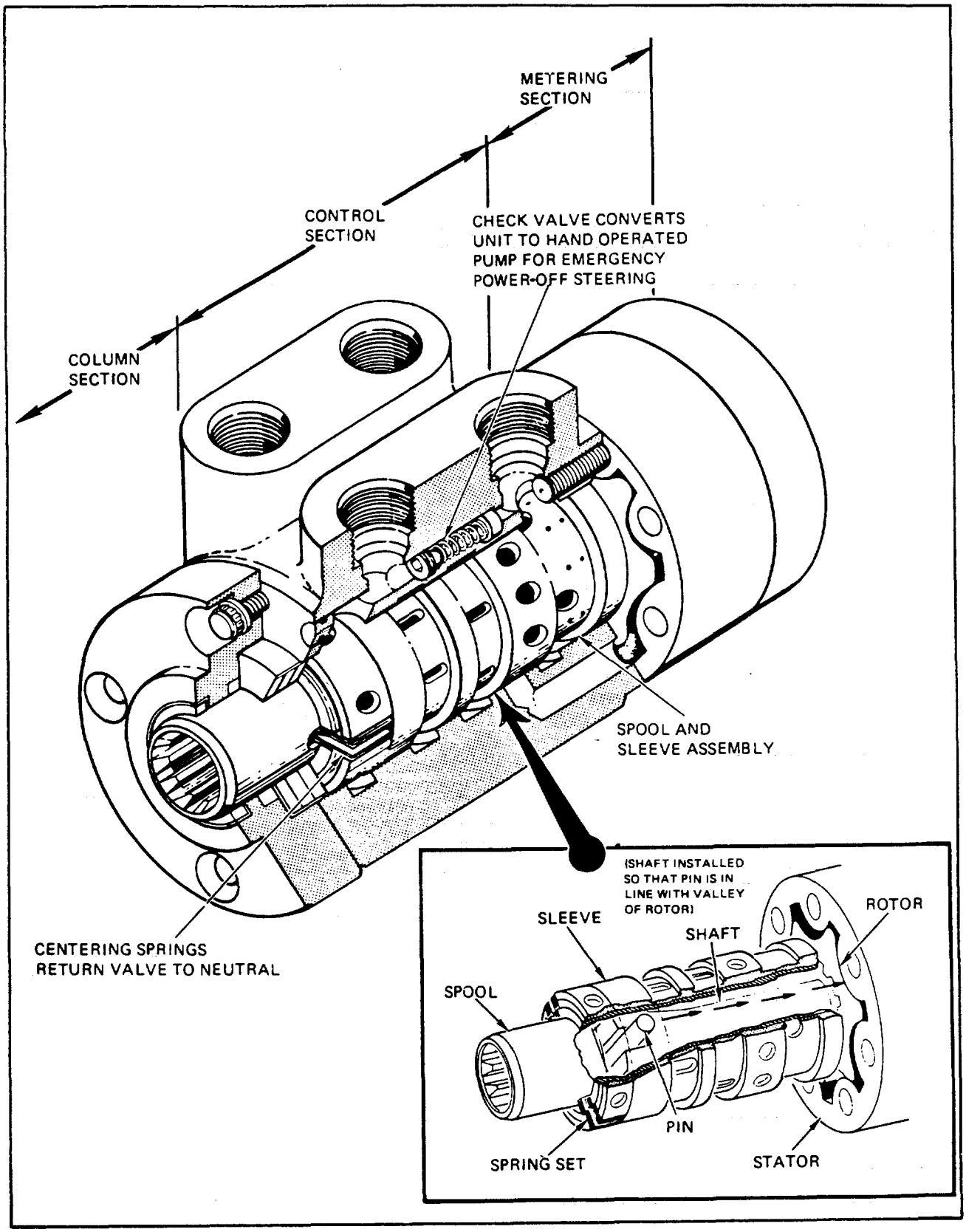
METERING SECTION
CONTROL SECTION
CHECK VALVE CONVERTS UNIT TO HAND OPERATED PUMP FOR EMERGENCY POWER-OFF STEERING
COLUMN SECTION
SPOOL AND SLEEVE ASSEMBLY
CENTERING SPRINGS RETURN VALVE TO NEUTRAL
(SHAFT INSTALLED SO THAT PIN IS IN LINE WITH VALLEY OF ROTOR)
SLEEVE
SHAFT
ROTOR
SPOOL
PIN
SPRING SET
STATOR

FIGURE 9-2.

(3) a metering section.

The column section provides a means of mounting and actuating the control and metering sections. The control section distributes the oil to and from the metering section. The metering section determines the quantity of oil delivered to the control section.

9-10. The column section consists of a splined shaft and housing assembly. The unit steering wheel is splined to one end of the shaft. The opposite end of the shaft is splined into the control section spool to rotate the spool for distribution of oil.

9-11. The control section consists of a spool and sleeve assembly, six centering springs and a manual steering check valve mounted in a cast housing. The housing also contains an inlet port, a dump port and two steering cylinder ports. The spool is fitted into the center of the sleeve and is held in place in the sleeve by a straight pin and the set of six centering springs. The pin extends through the sleeve and two radial slots in the spool. The pin is a tight fit in the sleeve and a loose fit in the spool. The centering springs extend through the spool and out each side of the sleeve so that they return the spool to the center position. The spool contains a series of porting holes that align with similar holes in the sleeve when the spool is rotated off of the center position.

9-12. A shaft with a radial slot at one end and splines at the opposite end connects the control section to the metering section. The slotted end of the shaft mates with the straight pin extending through the spool. The splined end fits into the center of the rotor set closest to the control section. The control section is also attached to the metering section through a porting plate.

9-13. The metering section consists of a rotor set (metering element) which is connected to the control section spool. The rotor set consists of a matched rotor and stator.

9-14. The stator has seven concave configurations (serving as oil cavities). It also contains the same number of convex configurations, each one being diametrically opposite a cavity. The rotor contains six lobes that are formed to mate with the stator cavities. Each lobe has a diametrically opposite lobe: therefore when one rotor is in a cavity of the stator, its opposite lobe is at the crest of the stator convex configuration opposite the cavity. Due to the interaction between the rotor and stator, there are 42 overlapping fluid discharging actions in one revolution of the rotor.

9-15. OPERATION (see figure 9-2).

9-16. Rotation of the steering wheel actuates three main components in the steering control unit:

(1) The control section spool

(2) The control section sleeve

(3) The metering element (rotor) in the metering section.

When the steering wheel is stationary, the control section spool and sleeve are held in the center position by the six centering springs. During this condition, oil is received from the system hydraulic pump and is routed back to the tank.

9-17. As the steering wheel is turned and the spool just begins to rotate, the spring set tends to rotate the sleeve to maintain the "center" relationship between the spool and sleeve. However, the force required to turn the rotor set is greater than the spring pressure and the6springs start to flex. This "flexing" action permits the spool to move within the sleeve (approximately 1/8 inch) until the ends of the spool slots contact the straight pin extending through the sleeve and the spool. In this position, the porting holes in the sleeve and spool are aligned. This permits incoming oil to flow to the metering section and opens one of the cylinder ports.

9-18. Further rotation of the steering wheel causes the spool to rotate the pin, which then turns the sleeve and the rotor in the metering section. At this time, oil is being metered by the metering section and is allowed to flow through the spool and sleeve to one side of the steering cylinder. The porting arrangement also allows the oil to flow from the opposite side of the cylinder, through the control section and back to the hydraulic tank. The output of the metering section is directly proportional to the speed and distance that the steering wheel rotates.

9-19. When rotation of the steering wheel stops, the metering action in the metering section also stops. The six centering springs then return the sleeve to the neutral (open-center) position. When this occurs,

pressure is maintained in the cylinder to maintain guide roll position, but all incoming oil from the system pump flows back to the tank. To return the guide roll to the straight ahead position, the steering wheel must be rotated in the opposite direction. The control unit will then function as described, but all parts will rotate in the opposite direction.

9-20. REMOVAL OF STEERING CONTROL UNIT.

a. Remove the horn cover and lock ring, then lift the horn button assembly from the steering wheel (see figure 9-3).

b. Remove steering wheel jam nut and use a puller to remove steering wheel. Then remove the two countersunk mounting capscrews from the gooseneck (see figure 9-4).

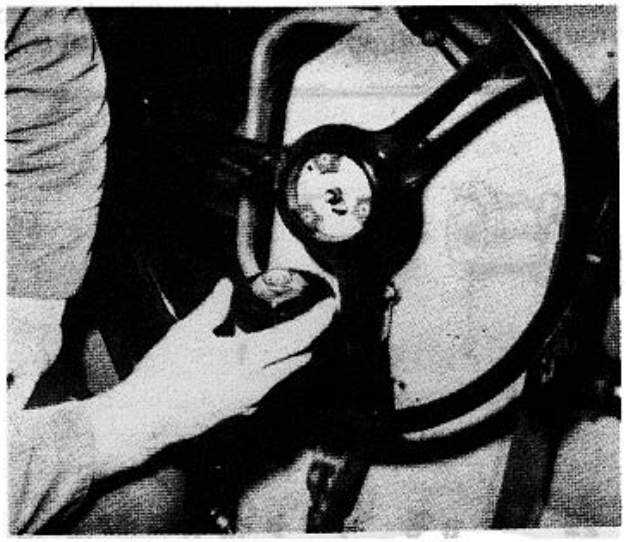

FIGURE 9-3.

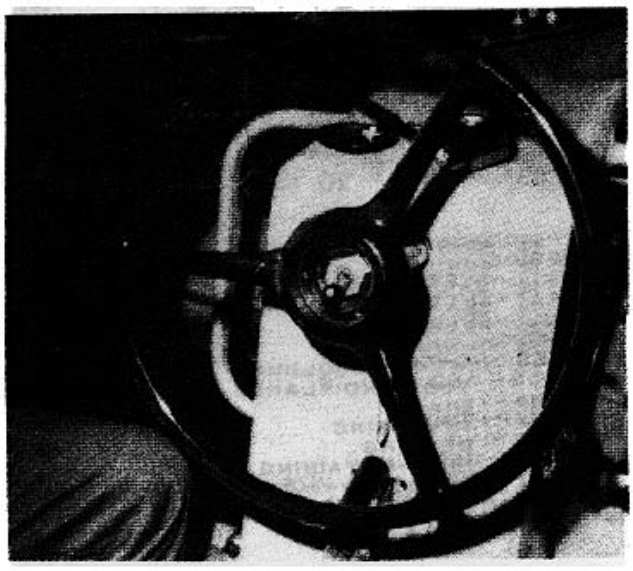

FIGURE 9-4.

c. Remove gooseneck access plate (see figure 9-5).

d. Disconnect the two hydraulic hoses and the water spray hose. Plug or cap all hoses and fittings (see figure 9-6).

NOTE: Mark the hydraulic hoses as to their position with respect to the steering cylinders.

e. Disconnect the inlet hose from the pump and the return hose from the tank. Plug or cap all hoses and fittings. Remove the control unit and hoses from the gooseneck opening (see figure 9-7).

9-21. DISASSEMBLY OF STEERING CONTROL UNIT (see figures 9-2 and 9-8).

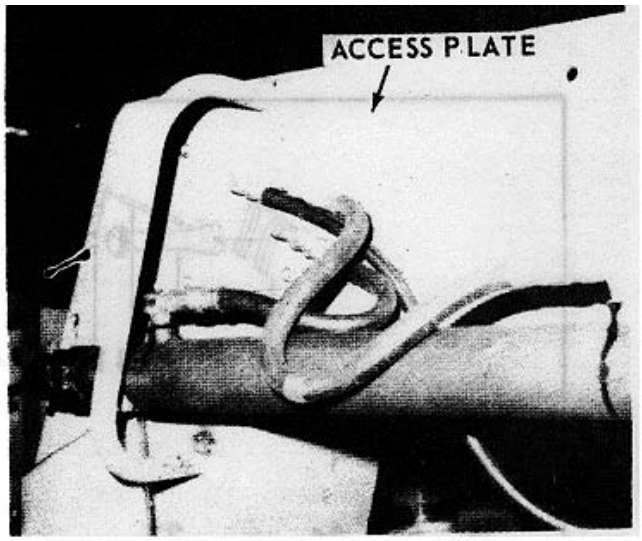

FIGURE 9-5.

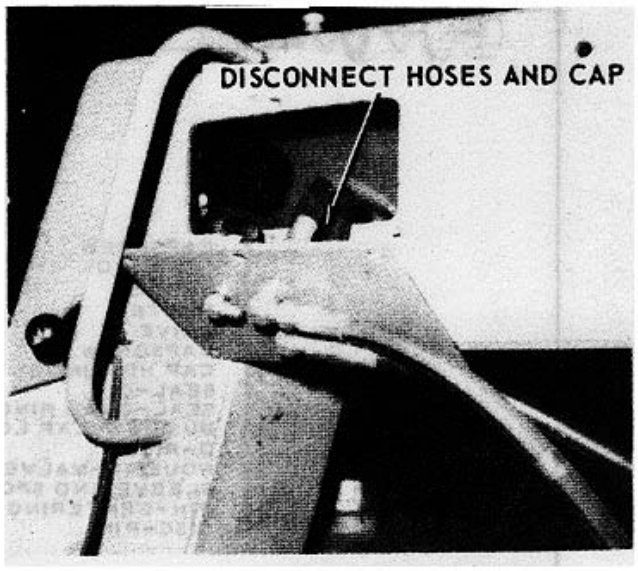

FIGURE 9-6.

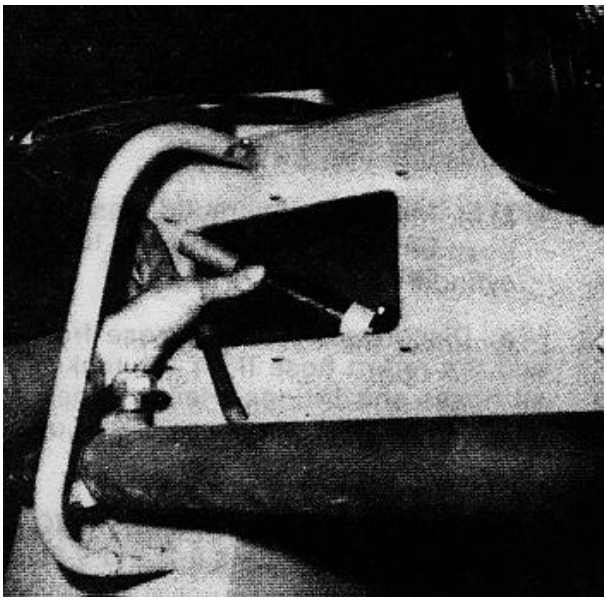

FIGURE 9-7.

a. Place the unit in vise, control end up. Clamp across port surface and opposite side of housing lightly. Remove the two capscrews that fasten column to lower unit. Remove column and set aside. Mark the capscrew holes so that the ports will be in the proper direction when reassembled (see figure 9-9).

b. Clamp unit in vise across mounting plate edges with meter end up and remove 7 capscrews (see figure 9-10).

c. Lift off metering section (see figures 9-11, 9-12, and 9-13).

d. Remove control assembly from vise and check for free rotation of the control spool and sleeve parts with column shaft (see figure 9-14).

e. Place clean wooden block across vise throat to support spool parts and clamp unit

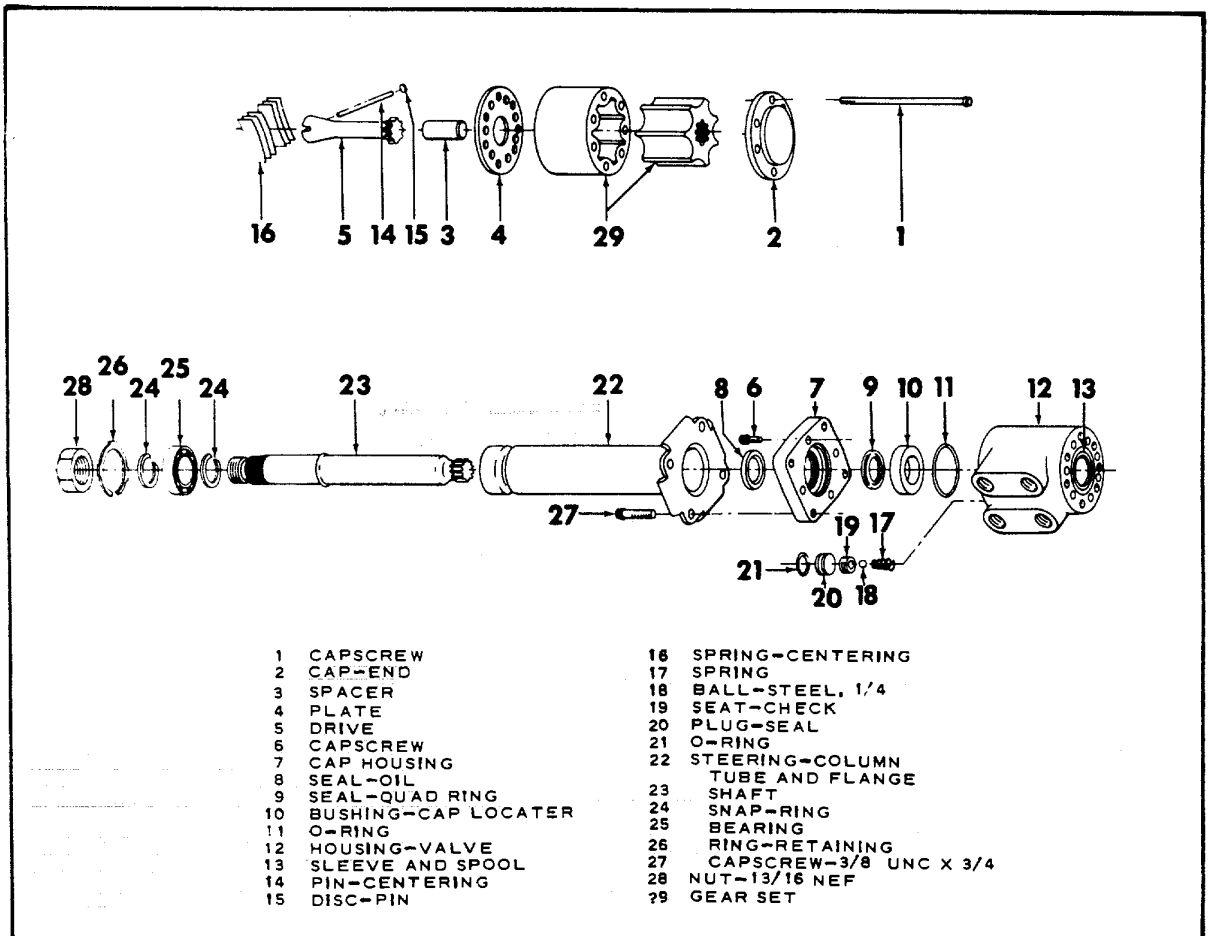

FIGURE 9-8.

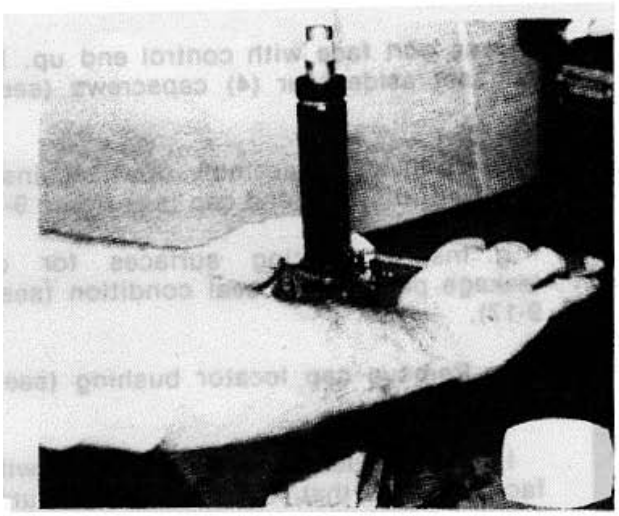

FIGURE 9-9A.

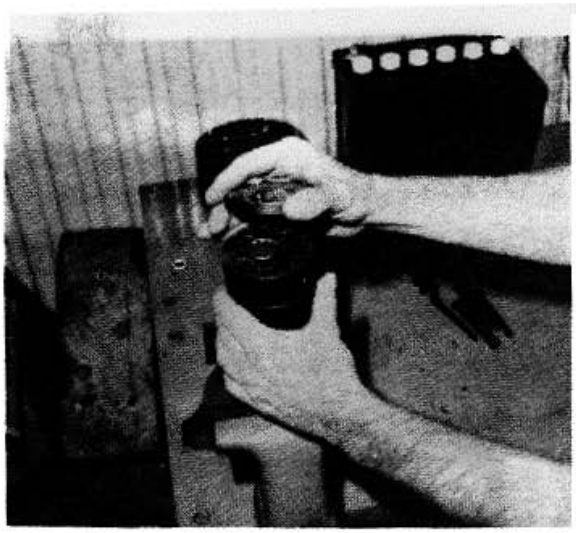

FIGURE 9-11.

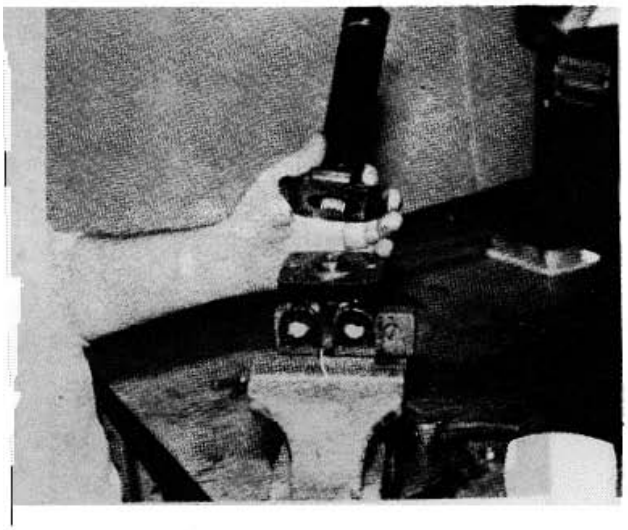

FIGURE 9-9B.

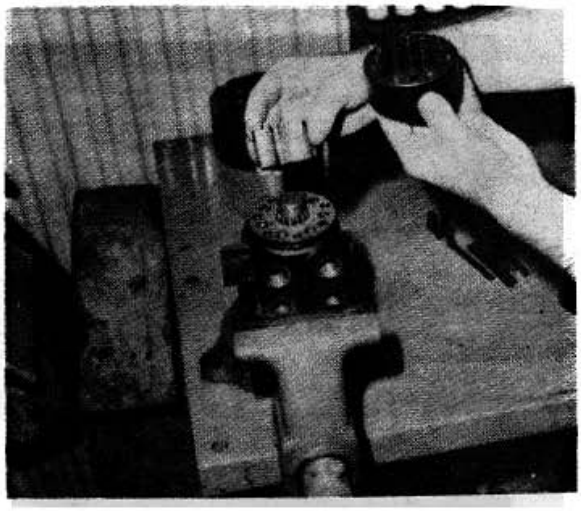

FIGURE 9-12.

FIGURE 9-10.

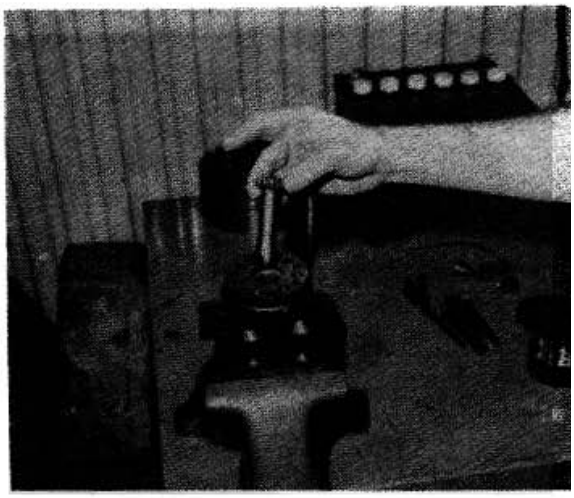

FIGURE 9-13.

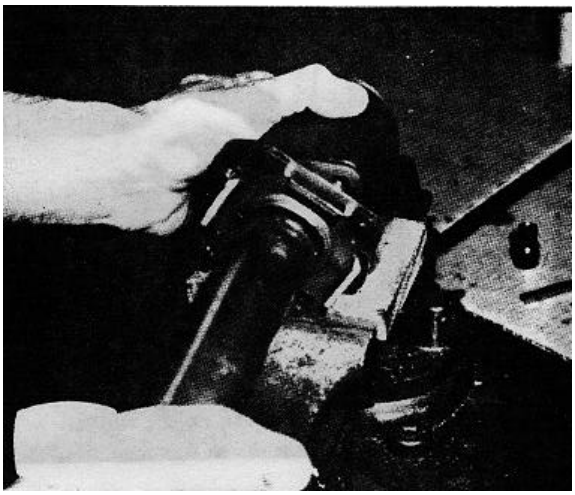

FIGURE 9-14.

across port face with control end up. Remove and set aside four (4) capscrews (see figure 9-1 5).

f. Hold spool assembly down against block in vise and lift off end cap (see figure 9-16).

g. Inspect mating surfaces for obvious leakage path, wear, seal condition (see figure 9-17).

h. Remove cap locator bushing (see figure 9-18).

i. Place housing on solid surface with port face down so that it can be held securely and remove spool-sleeve assembly from the 14 hole end of housing (see figure 9-19).

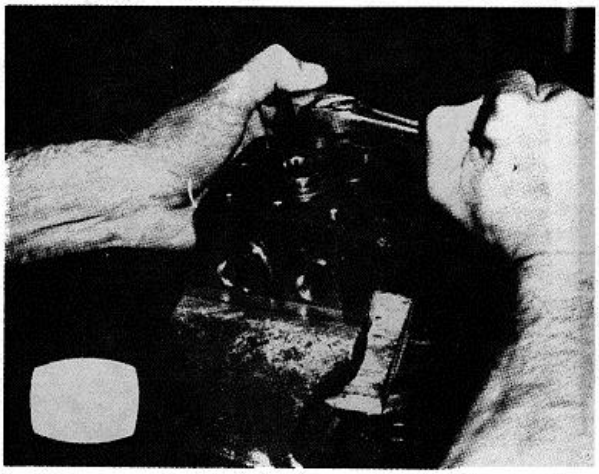

FIGURE 9-15.

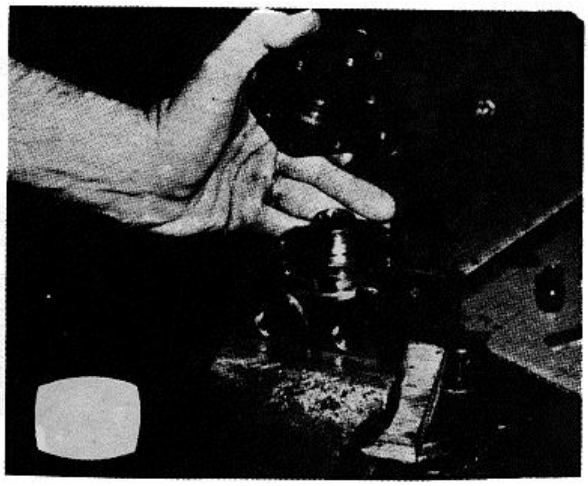

FIGURE 9-17.

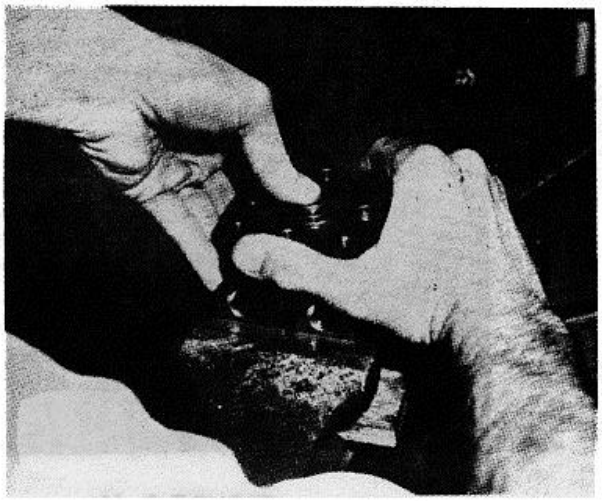

FIGURE 9-16.

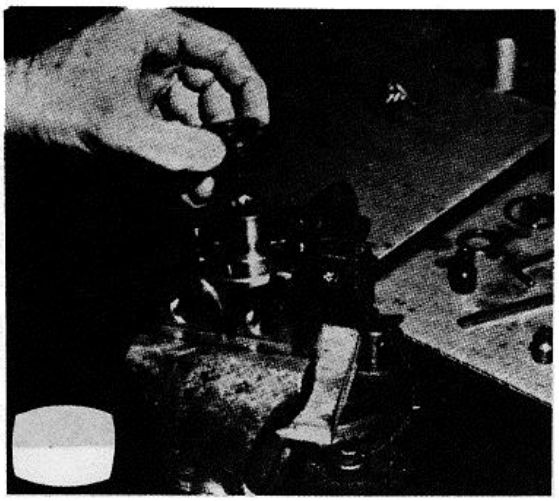

FIGURE 9-18.

j. Be extremely careful to prevent these parts from binding as they are very closely fitted and must generally be rotated slightly as they are withdrawn (see figure 9-20).

k. Using a small bent tool or wire, the check valve seal can be removed by pushing on it, reaching it through the "out" port. Do not pry against edge of hole in housing bore (see figure 9-21).

I. Place housing in vise, control end up, and unscrew check valve seat with 3/16 inch hex wrench (see figure 9-22).

m. Up-end the housing and tap slightly with butt of hand. Hold check valve hole toward lowest corner and remove check valve seat, ball and spring (see figure 9-23).

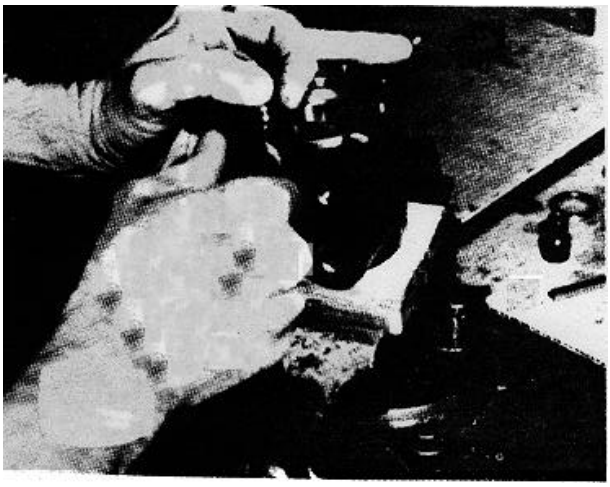

FIGURE 9-21.

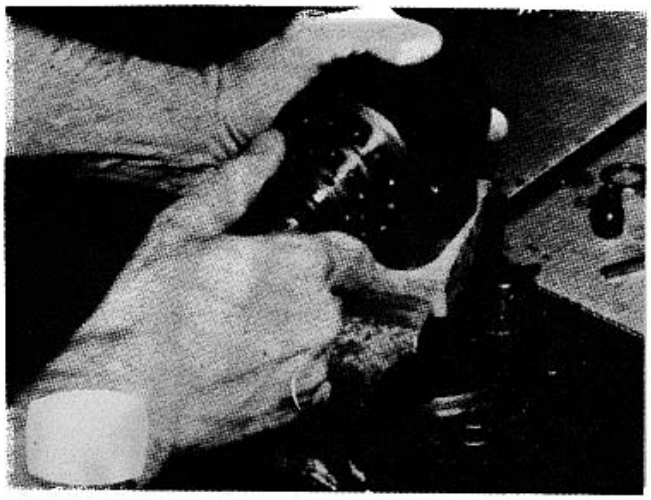

FIGURE 9-19.

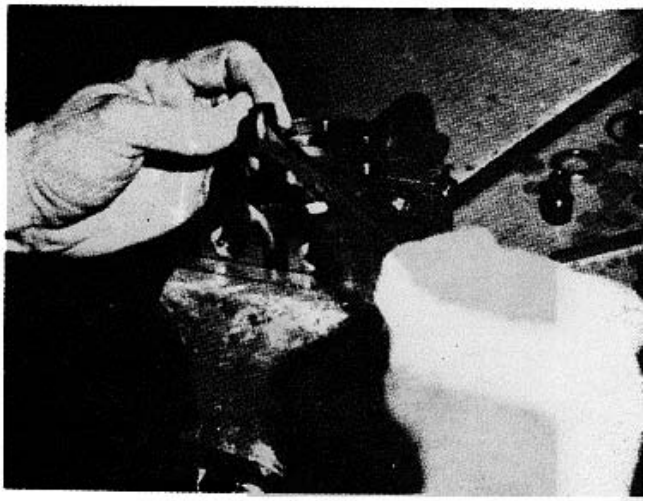

FIGURE 9-22.

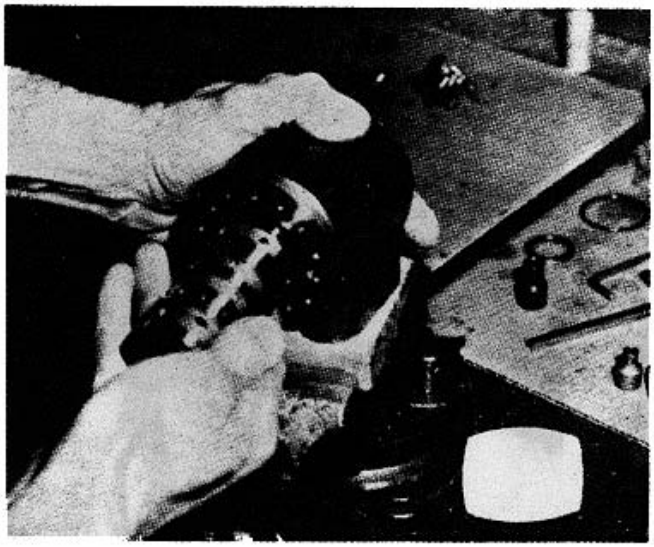

FIGURE 9-20.

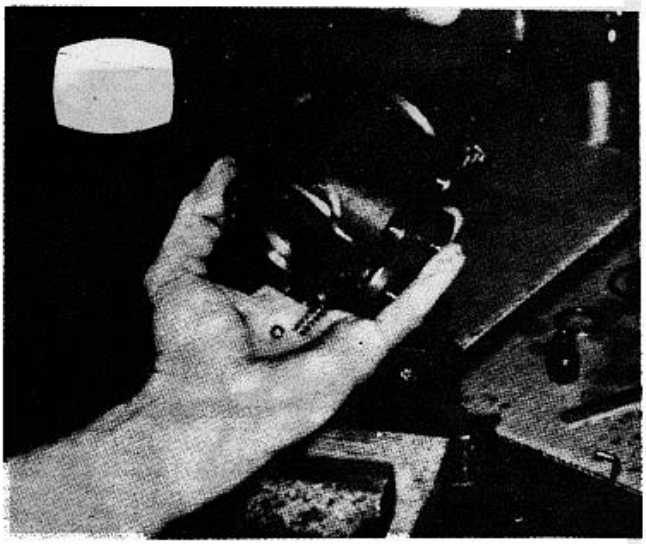

FIGURE 9-23.

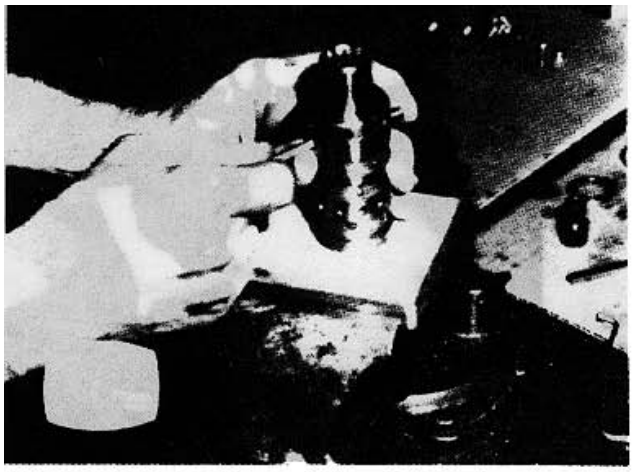

FIGURE 9-24.

FIGURE 9-27.

FIGURE 9-25.

FIGURE 9-28.

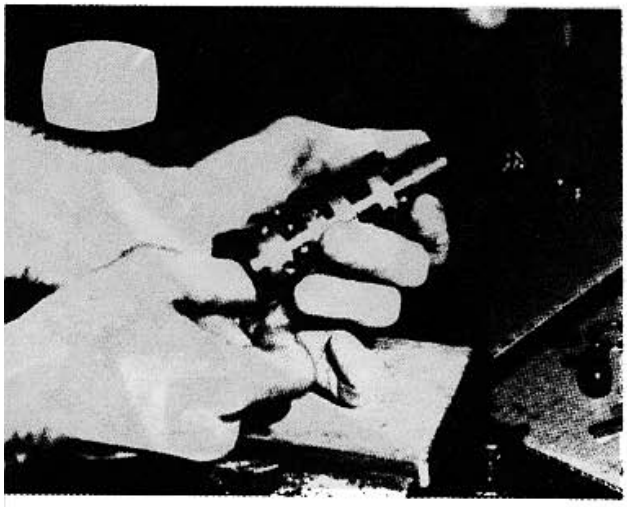

FIGURE 9-26.

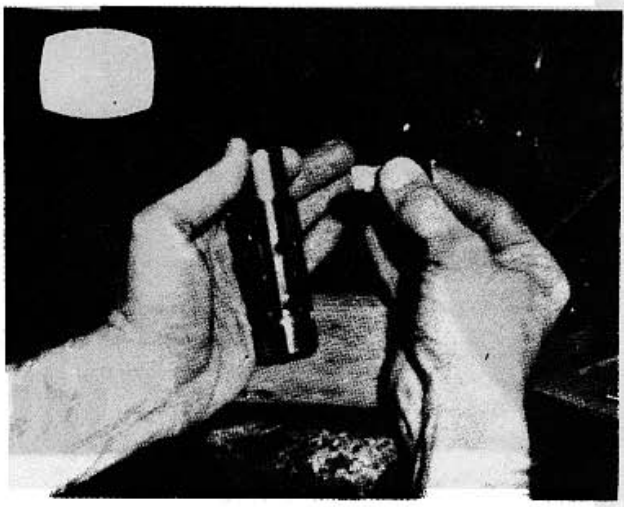

FIGURE 9-29.

n. In spool assembly, push the cross pin to loosen from spool sleeve assembly (see figure 9-24). Remove cross pin and set aside (see figure 9-25).

o. Push inside lower edge of spool so that spool moves towards splined end and remove carefully from sleeve (see figures 9-26 and 9-27).

p. Push centering spring set out of spring slot in spool (see figures 9-28 and 9-29).

9-22. INSPECTION.

9-23. Each part should be rinsed carefully in clean solvent, even such exterior parts as all capscrews and all seals that appear to be reusable. If in doubt, replace with new seals. It is good service policy to replace all seals when unit is reassembled. They are available in kit form. Rinsing and cleaning can be done while other parts of the unit are being disassembled and parts can be set to dry on clean paper towel. The meter gear set must be disassembled and cleaned similarly.

9-24. Inspect all moving surfaces to insure that they have not been scored or abraded by dirt particles or otherwise disrupted. Smooth burnished surfaces are normal in many areas. Slightly scored parts can be cleaned with 600 grit abrasive paper by hand rubbing only.

9-25. To prepare all surfaces of the meter section for reassembly and insure that all edges of the parts are burr free, place a piece of 600 grit abrasive paper face up on an extremely flat, clean, hard surface. The surface to be used for this purpose should be as flat as plate glass or better. If the 600 grit paper is new it should first be rubbed down with a scrap steel part to remove grit which would produce scratches. The ends of the star gear can be used for this purpose if necessary. Then both sides of the ring gear, both sides of the plate, the 14 hole end of the housing and the flat side of the end cap should be cleaned lightly.

9-26. Stroke each surface across the abrasive several times and observe the part (see figures 9-30, 9-31 and 9-32). Any small bright area near an edge indicates a burr which must be removed. Hold the part so that contact with the abrasive is as flat as possible (Do not push one edge down hard or the part will become rounded). Check each part after 6 to 10 strokes across the abrasive. After polishing each part, rinse clean in solvent and blow dry. Keep these parts absolutely clean until they are assembled.

9-27. REASSEMBLY OF STEERING CONTROL UNIT .

CAUTION: Observe the shaft-to-rotor alignment procedures specified in figure 9-2. Do not oil any component prior to reassembly. The sealing of one component to another is dependent on lapped surfaces. Seepage may occur as a result of dust retained in an oil film. Blow all parts dry with compressed air prior to reassembly.

a. Place housing in vise with control end up.

FIGURE 9-30

FIGURE 9-31

9-32

SECTION 9
STEERING

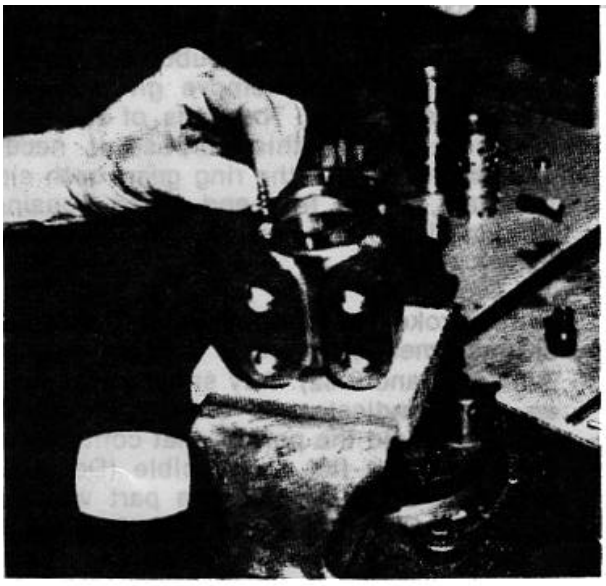

FIGURE 9-33

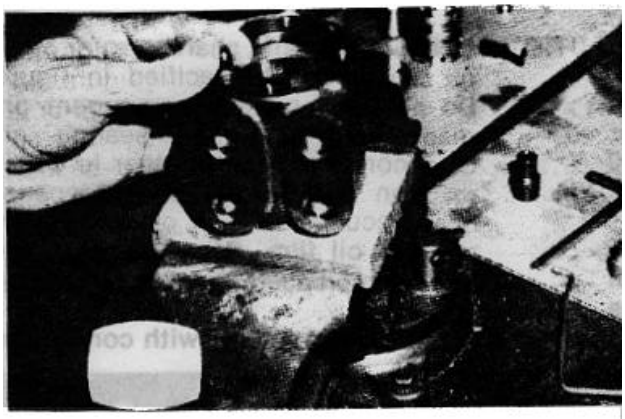

FIGURE 9-34

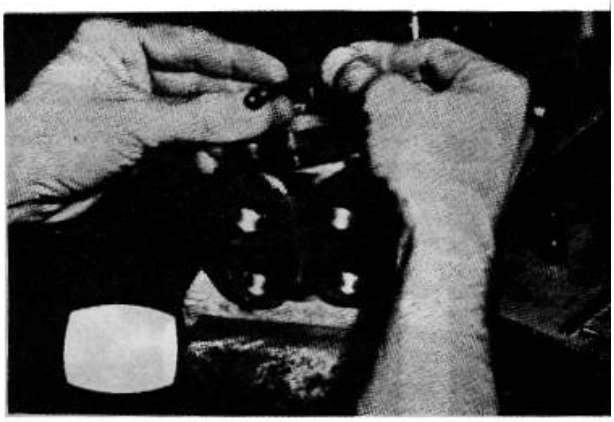

FIGURE 9-35

Protect 14 hole end and clamp across port surface lightly. Drop check valve spring into check hole with large end down (see figure 9-33).

b. Drop check ball into check hole and insure that it rests on top of the small end of the spring within the hole (see figure 9-34). Place the check valve seat on hex wrench and screw into threads within check hole so that the machined counterbore of the check seat is towards the ball (see figure 9-35).

c. Torque check seat to 12.5 ft.-lbs. (1.728 kg-m) (see figure 9-36). Test check ball action by pushing ball with small clean pin against spring force. Ball need NOT be snug against seat for proper function.

d. Install spool within sleeve carefully so that spring slots of both parts will be at same end. Rotate while sliding parts together (see figures 9-37 and 9-38). Test for free rotation. Spool should rotate smoothly in sleeve with finger tip force applied at splined end.

FIGURE 9-36

FIGURE 9-37

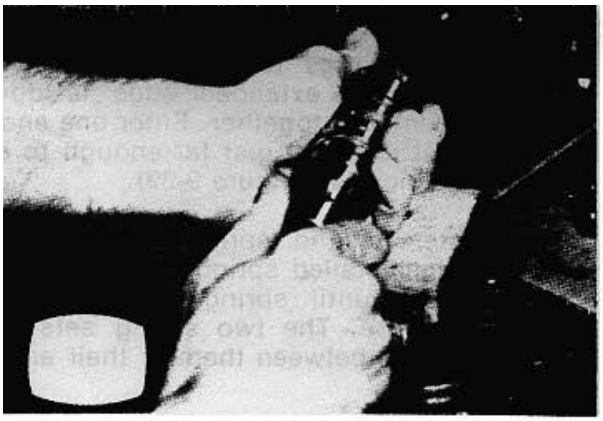

FIGURE 9-38

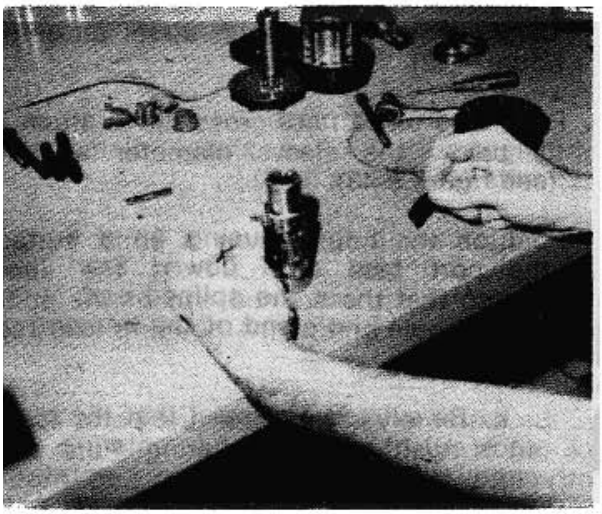

FIGURE 9-39

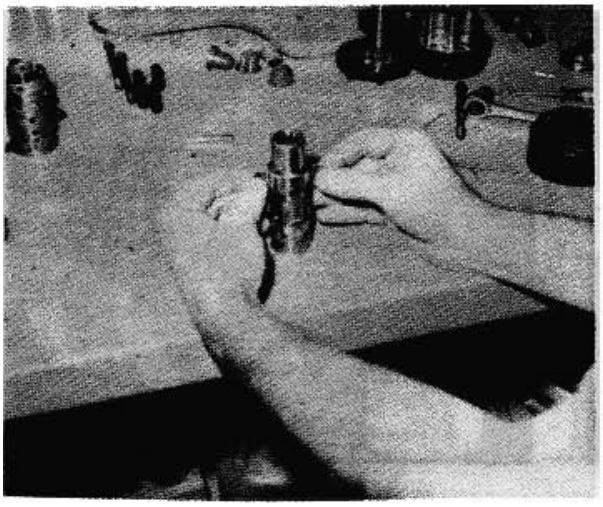

FIGURE 9-40

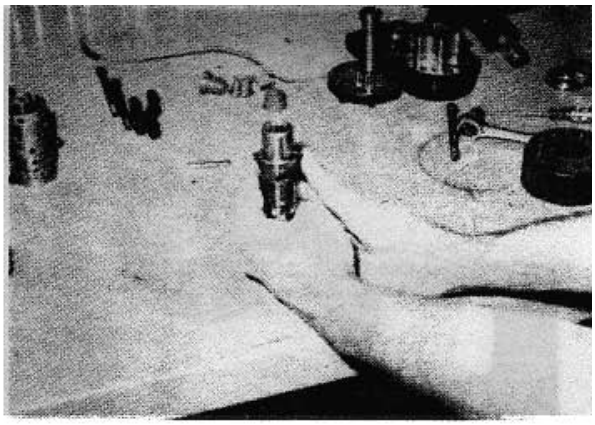

FIGURE 9-41

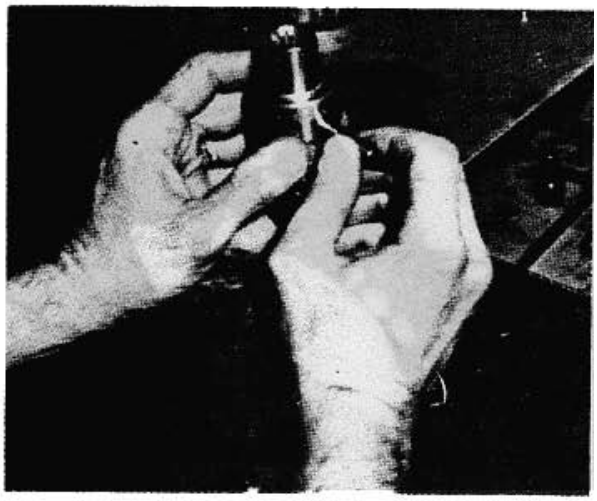

FIGURE 9-42

FIGURE 9-43

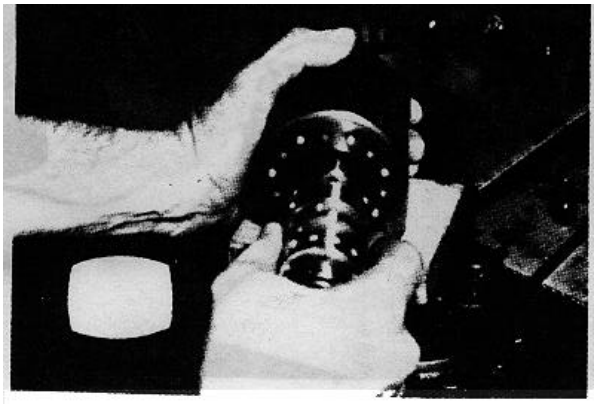

FIGURE 9-44

FIGURE 9-45

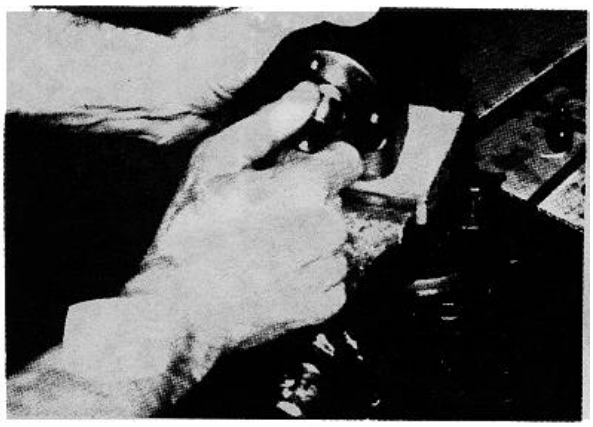

FIGURE 9-46

e. Bring spring slots in both parts in line and stand on end of bench. Position pairs of centering springs (or 2 sets of 3 each) on bench so that extended edge is down and arched center is together. Enter one end of one spring set into slot just far enough to edge on opposite side (see figure 9-39).

f. Enter second spring set from opposite side from installed spring set. Work the spring set around until spring set enters slot on opposite side. The two spring sets will now have tension between them at their arches (see figure 9-40).

g. Center the spring set so that they push down evenly and flush with the upper surface of the spool and sleeve (see figure 9-41).

h. Install cross pin through spool assembly (see figure 9-42).

i. Push into place until cross pin is flush or slightly below the sleeve diameter at both ends (see figure 9-43).

j. Position the housing on a solid surface with the port face down. Start the spool assembly so that the splined end of the spool enters the 14 hole end of the housing first (see figure 9-44).

k. Be extremely careful that the parts do not cock out of position while entering. Push parts gently into place with slight rotating motion (see figure 9-45). Bring the spool assembly entirely within the housing bore until the parts are flush at the meter end or 14 hole end of the housing. Do not pull the spool assembly beyond this point to prevent the cross pin from dropping into the discharge groove of the

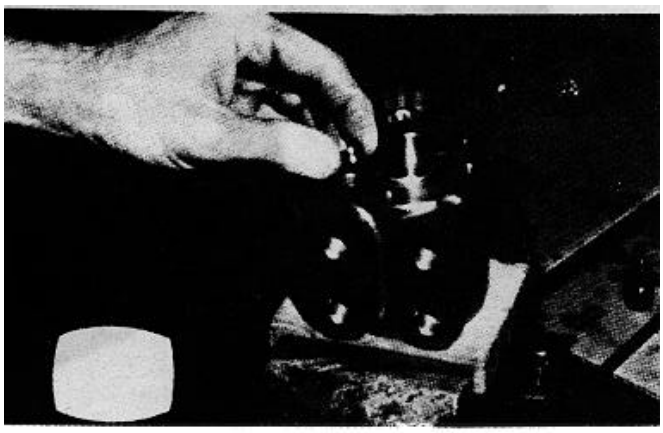

FIGURE 9-47

housing. With the spool assembly in this flush position, check for free rotation within the housing by turning with light finger force at the splined end (see figure 9-46). Hold the parts in this flush position and rest the 14 hole end of the assembly on the protective block on the vise and clamp lightly across the port face with the vise.

NOTE: It is good service policy to replace all seals when unit is reassembled. They are available in kit form.

NOTE: Do not force the spool into the housing if it will not slide In freely. The assembly tolerance is so close that the temperature of your hand can expand metal of the spool enough that it will not slide in the housing.

I. Check the condition of the o-ring seal on the check plug and replace it if necessary. Install the check plug in the check hole with a steady pressure while rocking it slightly so that the o-ring feeds in smoothly without cutting (see figures 9-47 and 9-48).

m. Position the cap locator bushing with large O. D. chamfer UP partly into end of housing (see figure 9-49). Insure that it seats against spool assembly flat and smooth by rotating with finger tips.

n. Check the mounting plate and shaft seal carefully to insure that they are clean and in good condition. Insure that the mounting plate seal grooves are clean and smooth. Each of these seals are slightly larger than its seal grooves so that they will be adequately retained in service. Push each gently into place and smooth down into seal groove with finger tip (see figure 9-50).

o. Thin oil seal at exterior of mounting is a dirt exclusion seal and does not generally need replacement. If this is replaced, it should be pressed into counterbore so that the lip is directed away from the unit.

p. Place the mounting plate sub-assembly over spool shaft and slide down into place over cap locator bushing smoothly so that seals will not be disrupted in assembly (see figure 9-51). Be certain that the mounting plate rests fairly flush against the end of housing assembly so that the cap locator bushing is not cocked and install four mounting plate capscrews. Tighten these evenly and gradually to a torque setting of 21 ft.-lbs. (2.9 kg-m) (see figure 9-52).

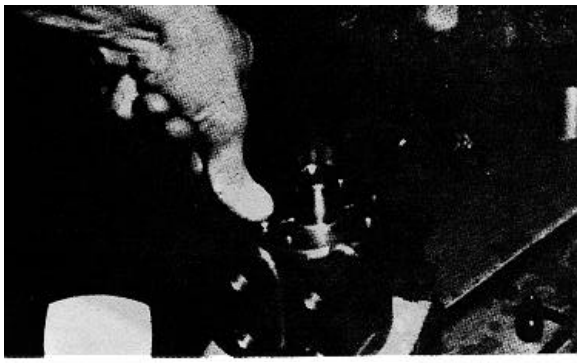

FIGURE 9-48

FIGURE 9-49

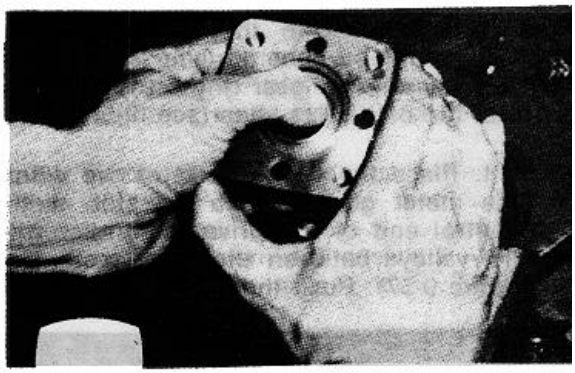

FIGURE 9-50

FIGURE 9-51

FIGURE 9-52

q. Reposition in vise and clamp across the edges of the mounting plate lightly. Check to insure that the spool and sleeve are flush or slightly below the 14 hole surface of the control housing (see figure 9-53).

r. Clean the upper surface of the housing by wiping with the back of a clean hand or the butt of the thumb. Clean each of the flat surfaces of the meter section parts as it is ready for assembly in a similar way (see figure 9-54).

s. Place the plate over this assembly so that the bolt- holes in the plate-align-with the tapped holes in the housing (see figure 9-55). Place the meter gear ring on the assembly so that the bolt holes align (see figure 9-56).

t. Place the splined end of the drive within the meter gear star so that the slot at the control end of the drive is in alignment with the valleys between the meter gear teeth (see figure 9-57). Push the splined end of the drive

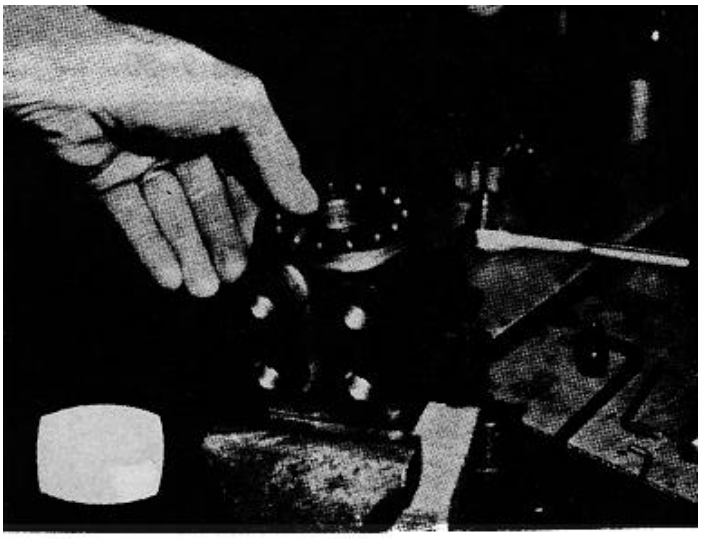

FIGURE 9-53

FIGURE 9-54

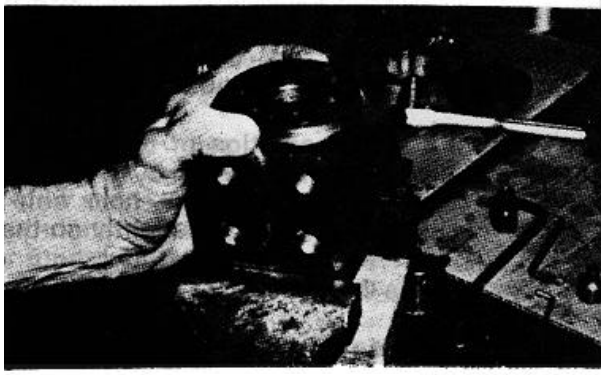

FIGURE 9-55

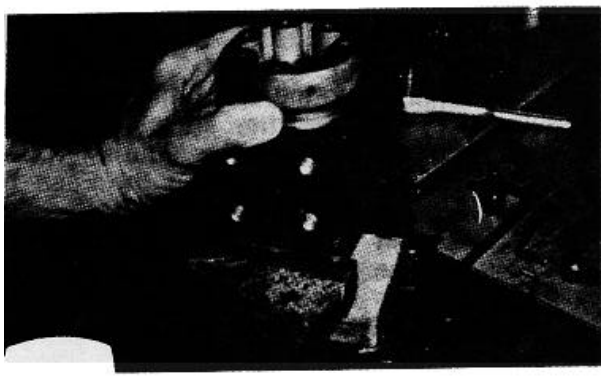

FIGURE 9-56

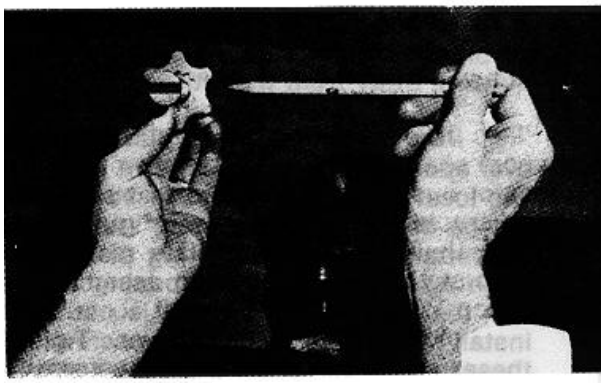

FIGURE 9-57

through the gear so that the spline extends about one half its length beyond the meter gear star and hold It in this position while installing into the unit. Note the position or direction of the cross pin within the unit. Enter the meter gear star into the meter gear ring and wiggle the parts slowly in position so that the drive does not become disengaged from the meter gear star. Hold the plate and meter gear ring in position on the assembly while the star is being installed. Rotate the meter gear star slightly to bring the cross slot of the drive into engagement with the cross pin and the splined end of the drive will drop down against the plate (see figures 9-58, 9-59 and 9-60).

WARNING: Alignment of the cross slot in the drive with valleys between the teeth of the meter gear star determines proper valve timing of the unit. There are 12 teeth on the spline and 6 pump teeth on the star. Alignment is exactly right in 6 positions and exactly wrong in 6 positions. If the parts slip out of position during this part of assembly, repeat until you are certain correct alignment is obtained (see figure 9-57).

u. Place the spacer in position within the end of the meter gear star (see figure 9-61). If the spacer does not drop flush with the gear surface, the drive has not properly engaged the cross pin - RECHECK. Place the meter end cap over the assembly and install two (2) capscrews, finger tight, to maintain alignment of the parts (see figure 9-62). Install all seven capscrews and bring them gradually and evenly to 12.5 ft.-lbs. (1.728 kg-m) (see figure 9-63).

FIGURE 9-58

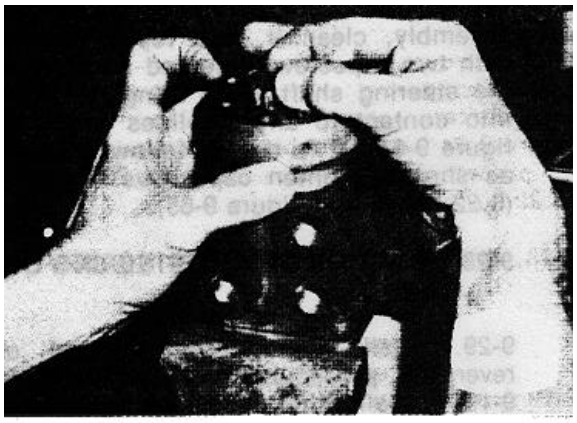

FIGURE 9-59

FIGURE 9-60

FIGURE 9-61

v. Check the condition of the column assembly, clean it, and replace on the unit with two capscrews oriented as before. Rotate the steering shaft while bringing the surfaces into contact to allow splines to engage (see figure 9-64). If in doubt, follow the orientation as shown. Tighten capscrews to 23.3 ft.-lbs. (3.22 kg-m) (see figure 9-65).

9-28. INSTALLATION OF STEERING CONTROL UNIT.

9-29. Install the steering control unit by reversing procedure presented in paragraph 9-19. Install hydraulic hoses per illustration figure 9-66.

CAUTION: Complete bleeding the system procedure paragraph 9-83 before returning unit to service.

FIGURE 9-62

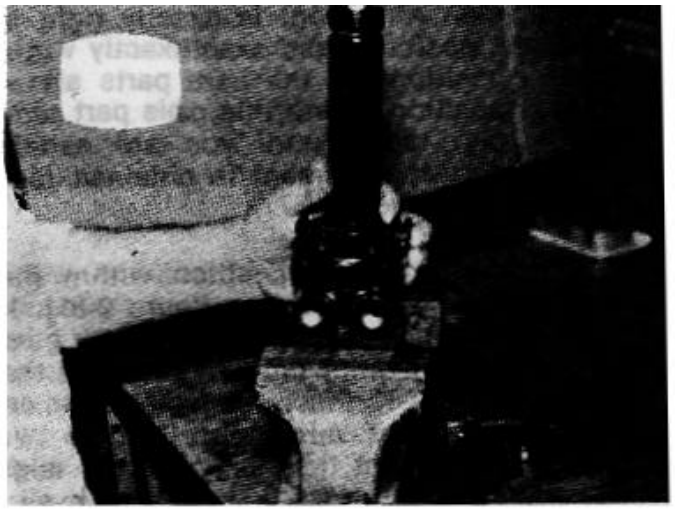

FIGURE 9-64

FIGURE 9-63

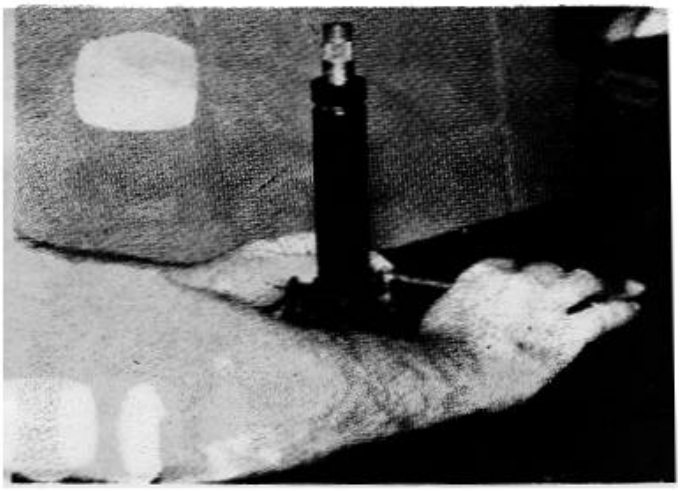

FIGURE 9-65

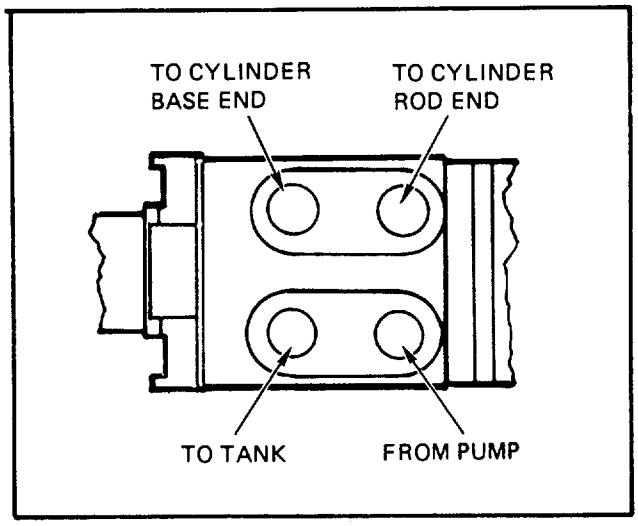

FIGURE 9-66.

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9-52. STEERING PUMP (DETROIT DIESEL UNITS).

9-53. DESCRIPTION.

9-54. The steering pump Is a positive displacement gear pump. It is located at the right rear of the Detroit Diesel engine and is gear driven (see figure 9-82).

9-55. The pump (see figure 9-91) is made up of a housing, two gears, four bearings, a front cover and a rear cover. Pressure loading the front bearing assures correct gear-to-bearing clearance. During pump operation, pressurized oil is directed to an area between the front cover and bearings, forcing them toward the gears. Pressure from the outlet side of the pump is against the opposite side of the bearings. When the two pressures are balanced, a thin film of oil

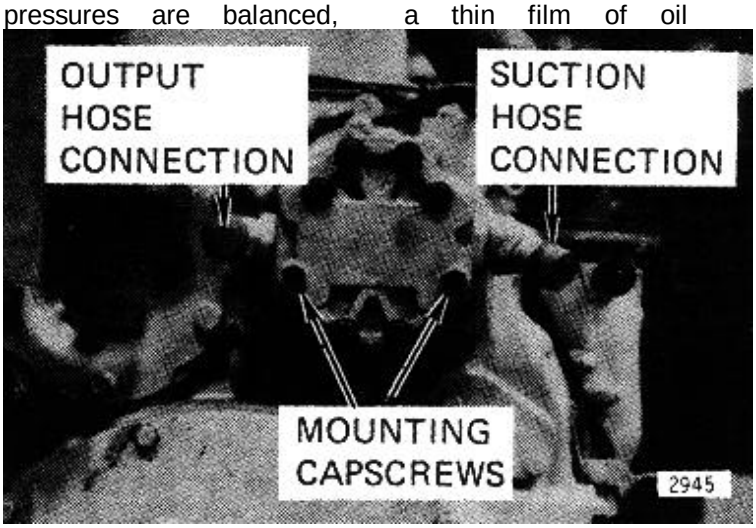


FIGURE 9-82.

exists between the gears and bearings, and actual gear-to-bearing contact is prohibited.

9-56. Oil is prevented from by-passing the body and end covers by neoprene gaskets between the components. A replaceable low pressure shaft seal is pressed into the front cover. Communication of the high pressure and low pressure oil between the bearings and front cover is prevented by a "W" shaped seal.

9-57. DISASSEMBLY OF STEERING PUMP.

a. Clean pump exterior. Remove woodruff key and capscrews. Separate rear cover from body. Remove and discard gasket. Remove front cover. Remove and discard front cover gasket. Lift out "W" shaped gasket seal and neoprene spacer (see figure 9-83). Drive out shaft seal.

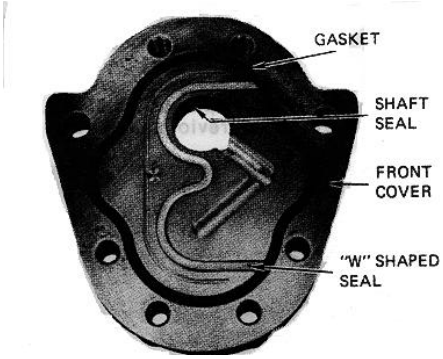


FIGURE 9-83.

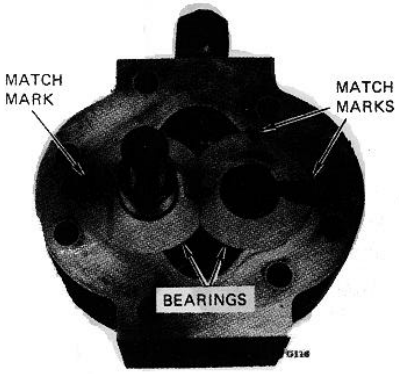


FIGURE 9-84.

b. Mark relative position of front and rear bearings and body (see figure 9-84). Do not scratch; use Prussion blue for marking of all pump parts. Push on rear of gear shafts until front bearings are free of the housing (see figure 9-85). Remove bearings. Mark relative position of gears, then extract gears. Match mark and remove rear bearings.

9-58. CLEANING AND INSPECTION.

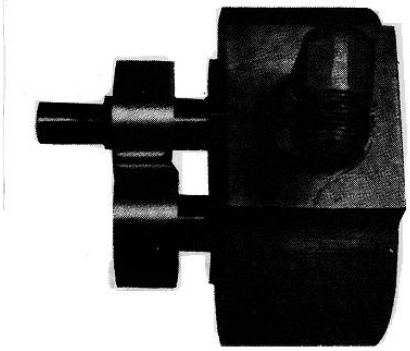


FIGURE 9-85.

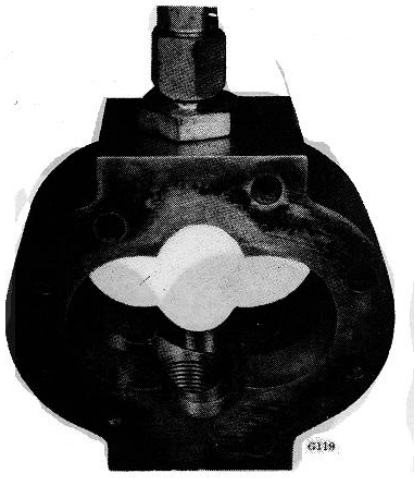


FIGURE 9-86.

a. Clean all parts thoroughly in cleaning solvent.

b. Check gears and shafts for nicks, burrs, cracks or chipping. Discard defective components.

c. Examine gear chamber of body for contact between gears and body, especially the intake cavity of the body. Although wear of more than 1/64 of an inch (0.397 mm) is abnormal, it is not critical if the bearings are not defective. The intake cavity is shown in figure 9-86.

d. Inspect the body and bearing for irregularities of the bore caused by bearing attempting to turn or signs of working. (see figure 9-87).

e. Examine bearings and body for scratches and pitting (see figure 9-88). Use fine sand paper on a surface plate to dress out any slight imperfections of bearings (see figure 9-89). Do not attempt to remove deep scratches or gouges. Check bearing bores for concentricity (see figure 9-90). Place bearings !n their respective positions in the body and check clearance between bearing flats. Under no circumstances should these clearances exceed specifications (refer to Section 2).

f. Check milled seal and gasket recesses of the cover for any obstruction that would prevent normal seating. Make sure internal threads of front cover and threads on capscrews are in good condition.

9-59. REASSEMBLY OF STEERING PUMP (see figure 9-91).

a. Apply a light coat of non-hardening gasket-cement to the bore in the front cover. Press new shaft seal into the bore and wipe off excess cement. Stake seal in three places.

NOTE: Generously lubricate all parts with SAE 10 W oil during pump assembly.

b. Install front bearing gears and rear bearings in their respective positions. Make sure all marks previously made during disassembly are aligned.

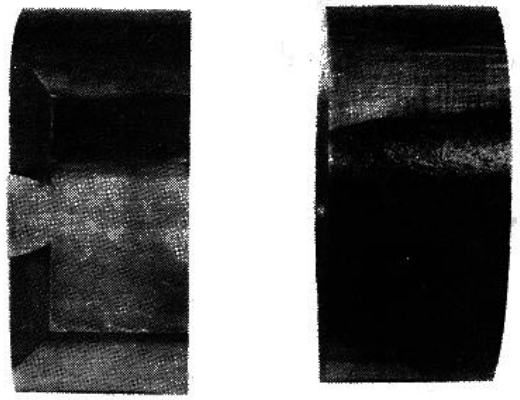


FIGURE 9-87.

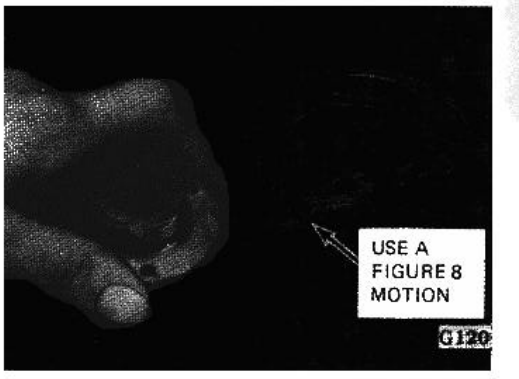


FIGURE 9-89.

FIGURE 9-88.

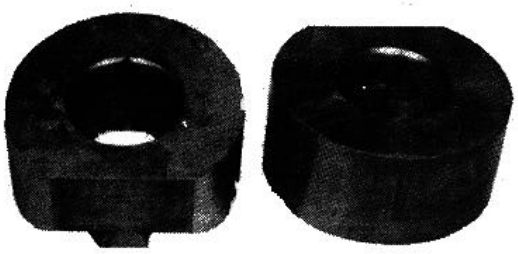
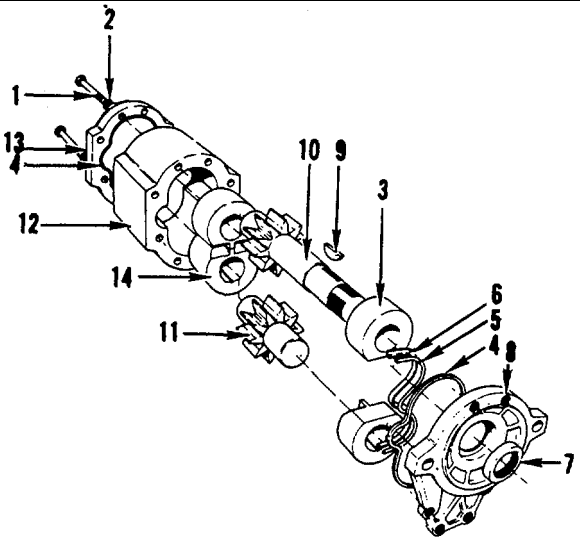


FIGURE 9-90.



1. CAPSCREW
2. LOCKWASHER
3. FRONT BEARING
4. GASKET
5. SPACER
6. GASKET SEAL
7. SHAFT SEAL
8. FRONT COVER
9. KEY
10. DRIVE GEAR
11. DRIVEN GEAR
12. BODY
13. REAR COVER
14. REAR BEARING

FIGURE 9-91.

c. Position gasket, spacer and "W" shaped gasket seal In front cover recesses.

d. Assemble front and rear cover to the body, being careful that the "W" gasket seal retains its position in the recess of the front cover. Tighten capscrews to specified torque.

CAUTION: The pump rotation is identified by arrow stamped on the pump body. When assembling the pump, the front cover (drive end of the pump) should be located on the "arrow" end.

9-60. INSTALLATION.

a. Tighten the mounting bolts securely.

b. Make certain all hydraulic fittings are tightened.

c. Bleed the system as specified in paragraph 9-83.

CAUTION: Check for abnormal hot spots. If any particular area is hot, disassemble and inspect.

9-61. FLOW DIVIDER (DETROIT DIESEL).

9-62. DESCRIPTION (see figure 9-92).

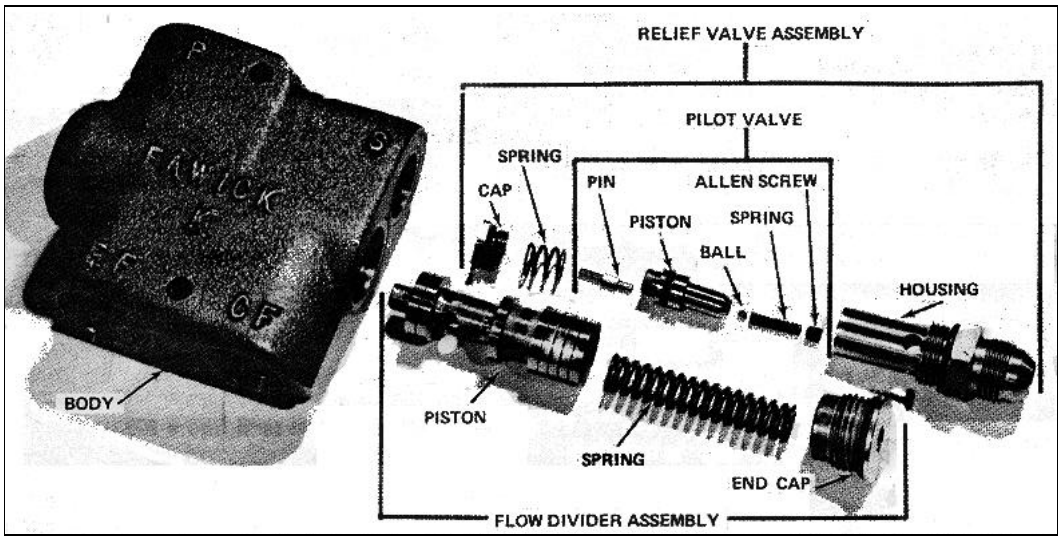


FIGURE 9-92.

9-63. The flow divider is mounted on the front, right-hand side of the engine compartment. Four hoses are routed to and from the flow divider. The unit consists of a body, a pressure-compensated piston and a pilot operated relief valve.

9-64. Port "P" is for the pump supply hose. Port "CF" is for controlled flow and is connected to the steering control unit at the gooseneck. Port "EF" is for excess flow and is connected to the inlet fitting of the pump. Port "S" is for relief flow and is connected to the outlet fitting in the hydraulic tank.

9-65. OPERATION (see figure 9-92).

9-66. At low pump speed, with input flow equal or less than set controlled flow, all flow is directed to the controlled flow "CF" port. The pressure-compensating pistons prevent or block any flow to the excess flow port. Controlled flow in this situation may be used up to the full integral relief valve pressure, however, the rate of controlled flow will decrease if the input flow decreases.

9-67. When input flow is increased, the pressure-compensated piston, in maintaining a fixed pressure drop across the orifice, moves further away from its stop position to allow fluid to flow from the input port to the excess flow "EF" port in maintaining the set controlled flow.

9-68. The pilot operated relief valve is factory set to 1500 ± 50 PSI (105.5 ± 3.5 kg/cm*")* and cannot be adjusted. This valve relieves excessive pressures due to shock loads or other causes.

9-69. REMOVAL OF FLOW DIVIDER (see figure 9-1.)

a. Remove all hydraulic lines from the flow divider and cap all openings.

b. Unscrew mounting capscrews and remove flow divider from mounting bracket.

9-70. DISASSEMBLY OF FLOW DIVIDER (see figure 9-92).

CAUTION: The piston end cap is spring loaded.

a. Remove end cap, spring and piston.

b. Remove relief valve assembly. If further disasssembly of the relief valve is required, follow these steps:

(1) Remove the spring loaded end cap and remove the spring and pin.

(2) Push the piston out of the housing by inserting a small drift into the hose end of the housing. Removal of piston may be difficult because the o-ring has to slide past threads.

9-71. CLEANING AND INSPECTION.

a. Clean all parts thoroughly.

b. Check bores and spools for nicks and scratches. Spools must slide freely in their bores.

c. Ports and orifices must be free of obstructions.

9-72. REASSEMBLY AND INSTALLATION OF FLOW DIVIDER (see figures 9-1 and 9-92).

CAUTION: Replace and oil all o-rings.

a. Insert the relief piston into the relief valve housing. Insert the pin into the piston (the short side goes into the piston) and the spring. Screw the end cap into relief valve housing.

b. Screw the relief valve housing assembly into the flow divider.

c. Install the piston, spring and cap.

d. Install the mounting capscrews.

e. Connect the hydraulic lines.

9-73. ADJUSTMENT OF FLOW DIVIDER RELIEF VALVE.

9-74. The relief valve is factory set at 1500 ±50 PSI (105.5 ± 3.5 kg/cm^2). Do not try to adjust or repair the relief valve, but replace the whole valve.

9-75. STEERING CYLINDER.

9-76. DESCRIPTION (see figure 9-93).

9-77. The steering cylinder is a double-acting cylinder consisting primarily of a shell, piston and rod assembly and two end plugs. Hydraulic oil applied to one of the cylinder ports acts against the piston, causing piston and

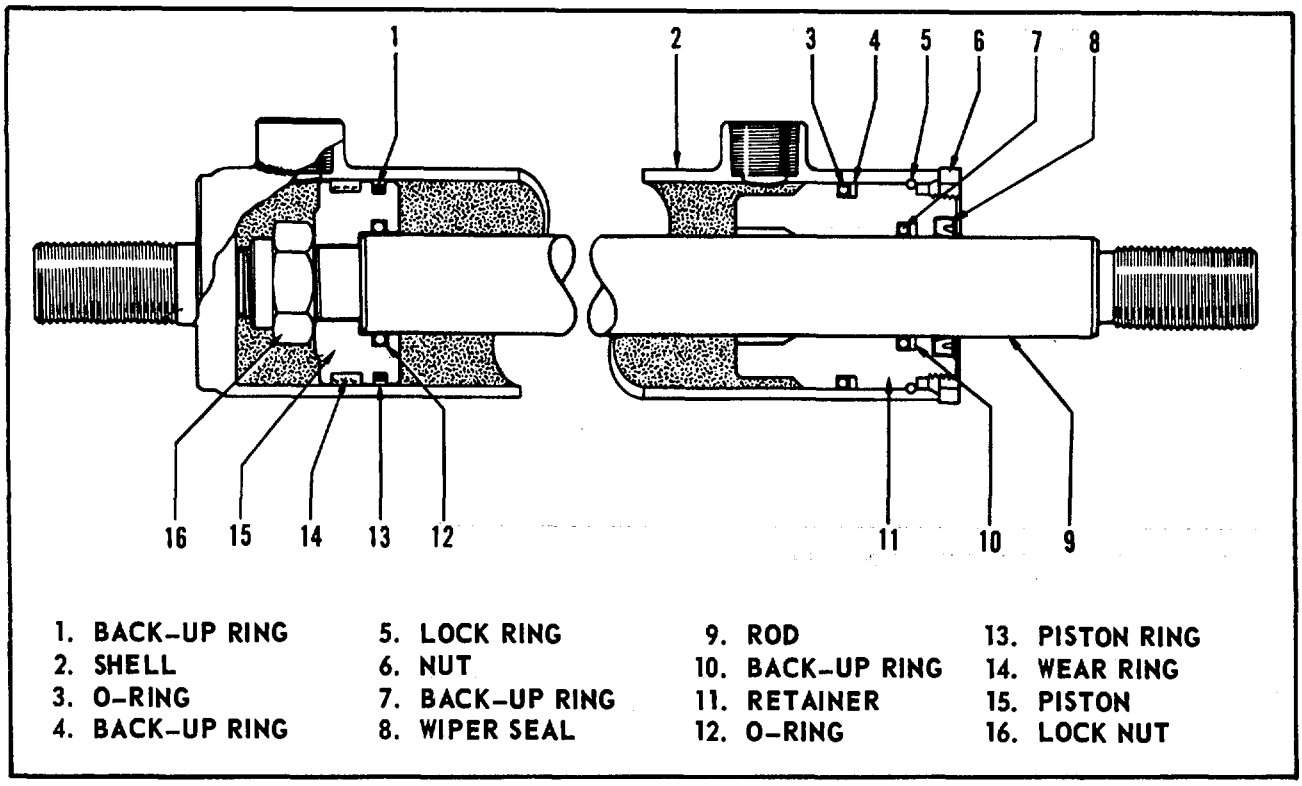


FIGURE 9-93.

rod movement. As one side of the cylinder fills, the opposite side is dumping an equal amount of oil. Oil is prevented from internally transferring from one side of the piston to the other by a teflon seal ring. The cylinder completes its stroke when the piston reaches a retainer. At this time, hydraulic pressure increases, causing the system relief valve to open. This prevents excessive pressure buildup in the system.

NOTE: For straight-ahead travel, the piston is positioned in the center of the cylinder shell.

9-78. REMOVAL OF STEERING CYLINDER (see figure 9-94).

a. Disconnect the hydraulic lines from the cylinder and plug or cap to keep out dirt and reduce oil loss.

b. Remove the cotter pin from the trunnion end of the cylinder and remove the plug and ball seat.

c. Remove dirt boot by straightening the connector straps.

d. Pry rod end of the cylinder from the ball stud.

e. Disconnect the shell end of the cylinder following steps b through d above.

f. Lift off cylinder and drain.

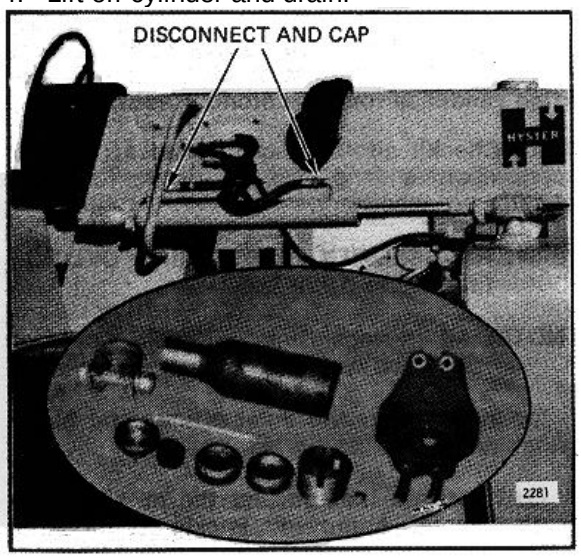


FIGURE 9-94.

9-79. DISASSEMBLY OF STEERING CYLINDER (see figure 9-93).

a. Remove rod end ball joint.

b. Unscrew and remove the retainer.

c. Using a section of hollow round stock, push the retainer into the cylinder shell until the snap ring can be easily removed from the shell.

d. Remove snap ring.

e. Pull sharply on rod to remove retainer, piston and rod.

f. Clamp rod in a vise between two pieces of clean, soft wood. Remove piston jam nut.

g. Tape rod threads and remove piston.

h. Remove the wear ring from piston if damaged, scored or chipped.

i. Remove the teflon piston ring and o-ring.

j. Remove the inner o-ring from the piston.

k. Remove retainer from the cylinder rod and remove the outer and inner o-rings and back-up rings.

I. Remove wiper seal from the end of the retainer.

9-80. CLEANING AND INSPECTION.

a. Wash all parts in solvent and inspect for nicks, burrs, and scratches. Dress parts with fine sandpaper or India stone if necessary.

b. Check all contact surfaces for any abnormalities and piston rings for wear. Replace if necessary.

9-81. REASSEMBLY OF STEERING CYLINDER (see figure 9-93).

NOTE: All o-rings and wipers should be replaced on reassembly.

a. Install outer and inner o-rings and backup rings and wiper seal in the retainer.

b. Lubricate the rod and the entire retainer with "Hyster Approved" Packing Lubrication. Carefully install the retainer on the rod.

c. Install inner o-ring in the piston.

d. Install the-wear ring, outer o-ring and teflon piston ring on the piston.

e. Lubricate the piston with "Hyster Approved" Packing Lubricant and install the piston on the rod.

f. Remove tape and install jam nut. Torque per specification.

g. Compress wear ring and piston ring with fingers and insert into the cylinder shell.

h. Push the rod and the retainer into the shell until the snap ring can be installed easily. Install snap ring.

i. Pull sharply on the rod until the retainer bottoms against the snap ring.

j. Install the nut on the retainer. Torque per specification.

k. Install rod end ball joint.

I. Lubricated the five rod end ball joint internal parts which include the spring seat, spring, both ball stud seats and threaded plug (refer to Section 4).

9-82. INSTALLATION OF STEERING CYLINDER (see figure 9-94).

a. Install the spring seat, spring and one ball stud seat in the shell end of the cylinder and position the cylinder on the gooseneck mounted ball stud.

b. Install the remaining ball stud seat and threaded plug. Tighten plug until the cylinder will hold its position horizontal to the floor without assistance.

c. Tighten plug until the cotter pin can be installed. Install cotter pin.

d. Connect hydraulic hoses to the cylinder.

e. Position the rod end ball stud joint on the trunnion arm mounted ball stud. Install the remaining ball stud seat the threaded plug.

f. Tighten plug until all the spring movement in the ball joint is taken up. Tighten plug until the cotter pin can be installed. Install the cotter pin.

g. Fold boots over the ball joints and secure their position with the metal ribbons.

9-83. BLEEDING THE SYSTEM.

9-84. Air may become trapped in the system if any hoses or components are removed. An aerated system Is indicated by jerky or spongy operation when the steering wheel is turned.

9-85. All hydraulic hoses leading to and from the cylinder enter at the top of the cylinder. Therefore, the system can be bled without disconnecting the hoses. Bleed the system as follows:

a. Fill the hydraulic tank with the specified oil (refer to Section 4).

b. Start the engine and allow to idle at 500 to 600 RPM for approximately one minute. This allows large. air bubbles in the system to escape.

WARNING: Do not extend the hands or arm through the center of the steering wheel. If the steering control unit has been disassembled and incorrectly timed, the wheel may suddenly become motorized or rotate abruptly with extreme force. If this occurs, see figure 9-2 and paragraph 9-27, step t and retime the control unit as shown.

c. Increase engine speed to approximately 1, 000 RPM and rotate the steering wheel as fast as possible in either direction. This should produce enough compression of oil to force the air out of the lines.

d. Continue to rotate the wheel in the same direction until the guide roll reaches its limit. Quickly reverse the steering wheel rotation to pressurize the opposite end of the steering cylinder.

e. Continue to rotate the wheel left and right, from stop to stop, until steering control is normal.

NOTE: If steering control fails to return to normal, air may be entering the system at the suction side of the pump (see figure 9-82). Check and tighten all hose fittings securely. Also check system pressure as specified in paragraph 9-86.

9-86. CHECKING RELIEF PRESSURE (see figure 9-95).

9-87. Pressure can be checked at the base of the steering cylinder fitting. Use a gauge rated at 3000 PSI (200 kg/cm^2) or greater. Oil temperature should be approximately 100° F. (37° C). To check pump output pressure, proceed as follows:

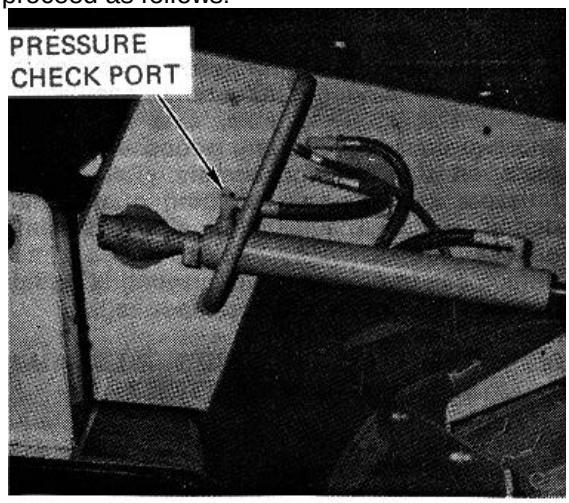


FIGURE 9-95.

a. Remove the plug at the steering cylinder base inlet fitting.

b. Connect pressure gauge to the cylinder fitting.

c. Start the engine and set speed at high idle. Rotate steering wheel from stop-to-stop. As guide rolls reach stops, the pressure gauge should indicate relief pressure (refer to Section 2).

CAUTION: Do not hold system over relief for longer than 20 seconds. This will damage the pump.

NOTE: If proper pressure is not obtained, remove the relief valve and clean all parts thoroughly. Carefully check the relief valve spool for burrs. Install the valve and recheck the pressure. If proper pressure cannot be

obtained, replace the relief valve assembly. If pressure remains low, disassemble the pump and inspect all parts for damage and wear.

9-88. STEERING TRUNNION ASSEMBLY.

9-89. DESCRIPTION (see figure 9-96).

9-90. The Steering Trunnion Assembly consists primarily of a king pin assembly, oscillation pin assembly, steering yoke, axle assembly, and two guide rolls. The unit gooseneck frame rests on the trunnion assembly. Two guide rolls are used to prevent scuffing of material during turns. The oscillation pin assembly allows the steering yoke to adjust to differences in ground levels preventing bridging between the drive drum and guide rolls.

9-91. REMOVAL OF GUIDE ROLLS AND STEERING AXLE ASSEMBLY.

9-92. The method of removing the axle shaft assembly depends upon the availability of the equipment. An overhead crane of a lift truck can be used to lift the front end of the unit so the guide rolls and steering axle assembly can be removed.

a. Remove front scraper assembly. Then position guide roll rear scraper in the "up" position (see figure 9-97).

WARNING: The scraper bar may be sharp.

b. Remove the capscrews (four) from both steering yoke caps. Then remove and tag the caps (see figure 9-98).

NOTE: Yoke caps are matched and must be assembled to the same side of the yoke from which they were removed.

WARNING: Be sure drive drum is securely blocked.

c. Lift the gooseneck up until the guide roll shaft will clear the steering yoke. Carefully roll the guide roll ahead. Block up the front of unit frame (see figure 9-99).

d. Lower the gooseneck until the frame is securely held by the blocks. Then lift the axle

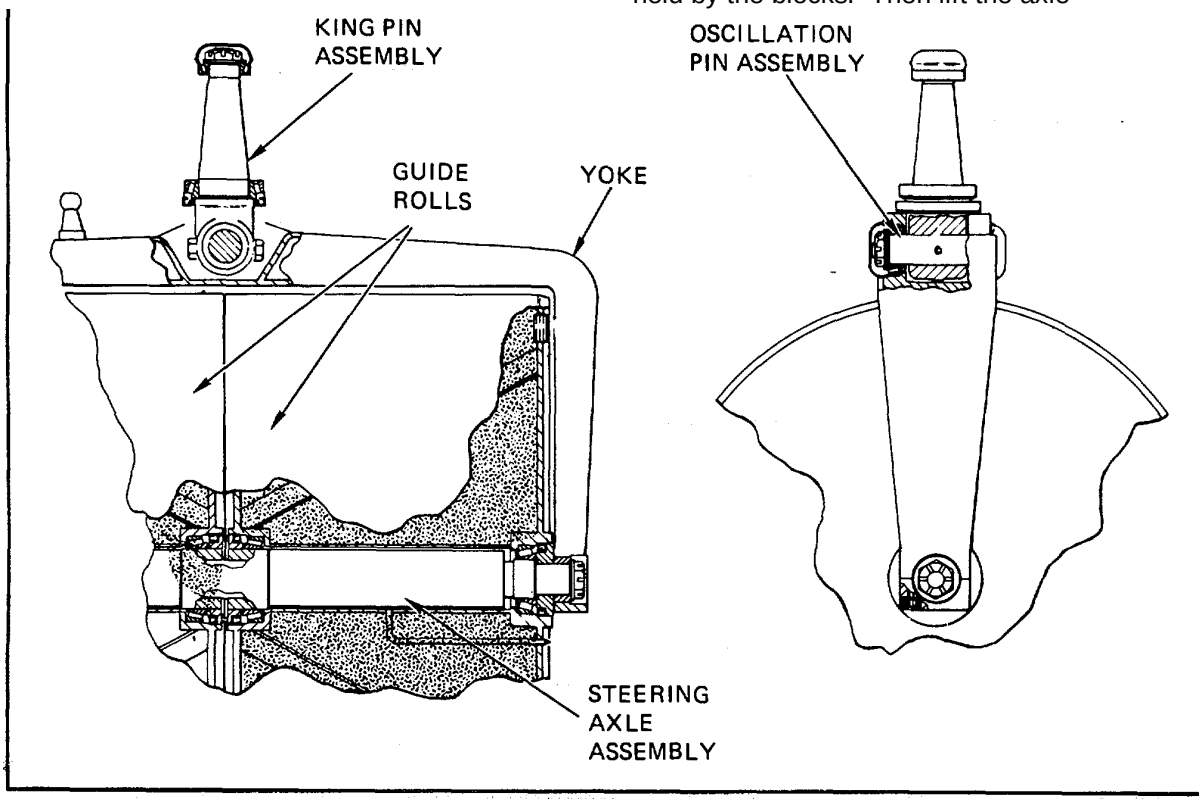


FIGURE 9-96.

shaft assembly away from the unit (see figure 9-100).

9-93. DISASSEMBLY OF AXLE SHAFT ASSEMBLY (see figure 9-101).

NOTE: Remove axle shaft assembly from unit by following procedure outlined in paragraph 9-91. Then position axle shaft assembly on a hard level surface.

a. Remove cotter pin, slotted nut, and thrust washer from one side.

b. Remove split spacers and solid spacer. Tag for reassembly into same position.

c. Slightly lift the drum (with components removed) and slide the drum off of the axle.

d. Perform steps a and b on the remaining drum, then pull the axle shaft from the drum.

e. Remove seals, bearings, shim(s) and center spacer from axle shaft.

CAUTION: Tag bearings and shim(s) for reassembly into same position.

f. Clean and inspect components per paragraph 9-94.

9-94. CLEANING AND INSPECTION.

a. Clean all parts in solvent or other suitable cleaning agent. Dry thoroughly with compressed air or clean lint-free cloth. If parts are not to be assembled immediately, coat all machined surfaces with clean oil and cover.

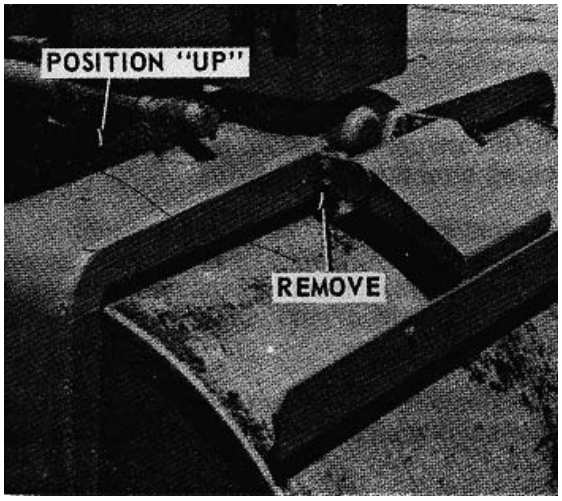


FIGURE 9-97.

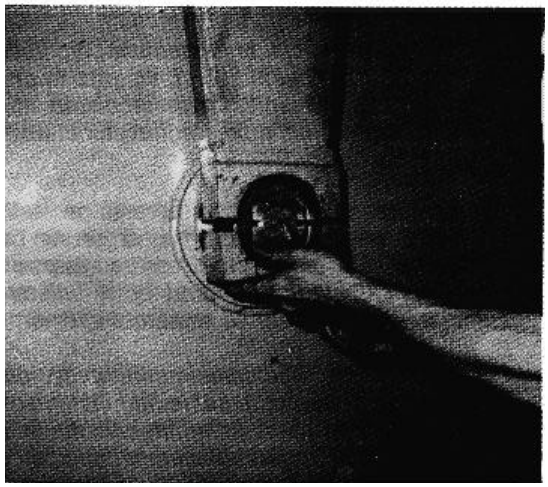


FIGURE 9-98.

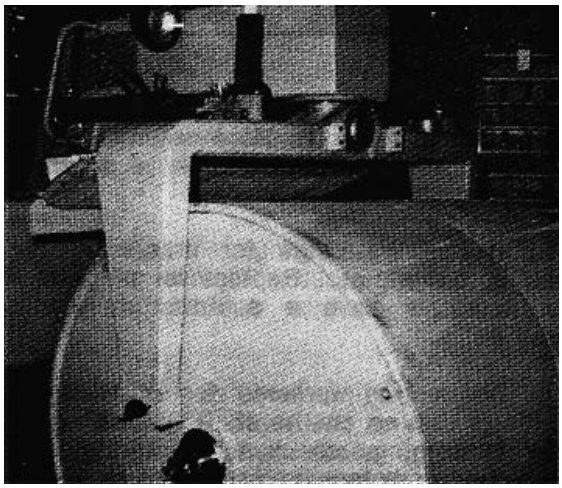


FIGURE 9-99.

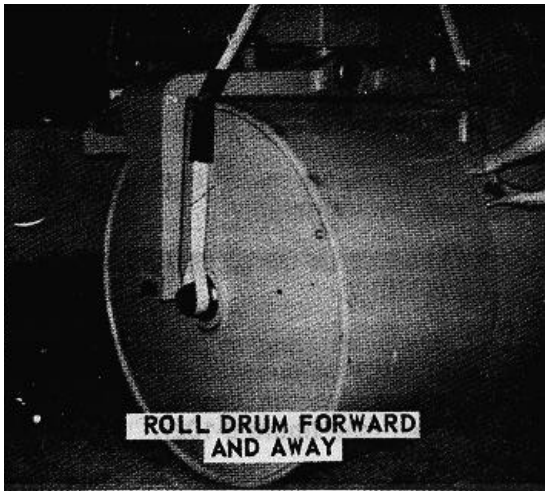


FIGURE 9-100.

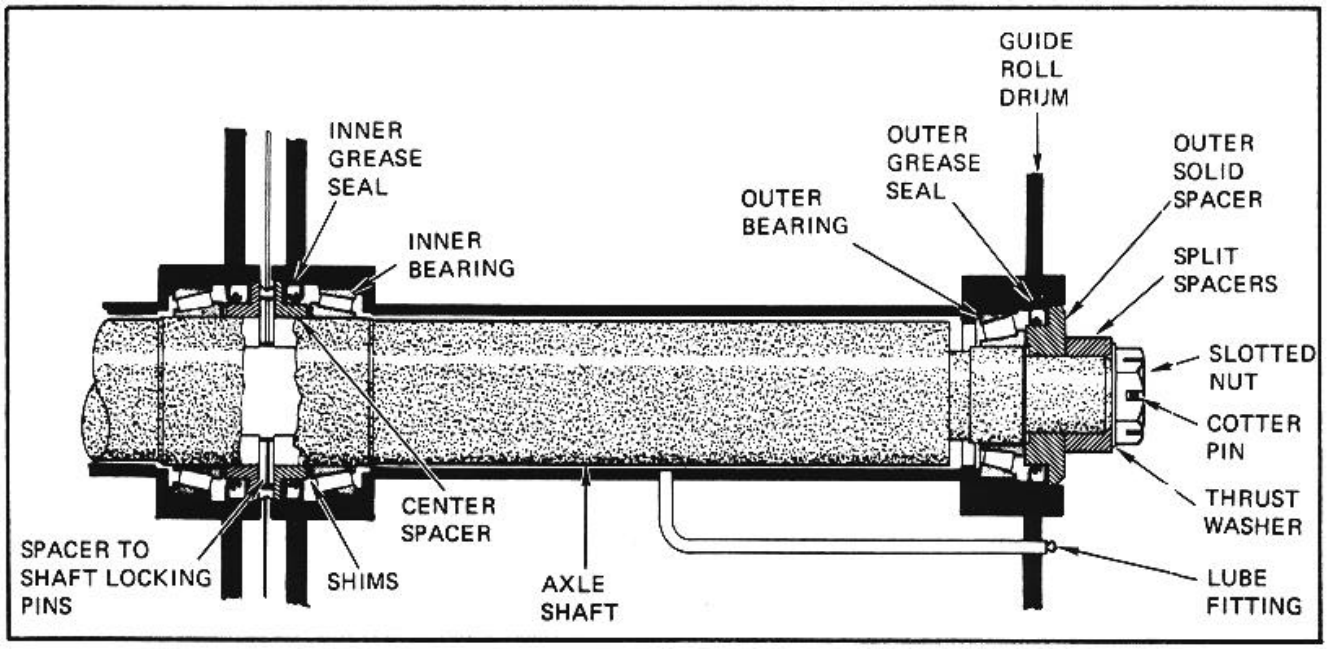


FIGURE 9-101.

b. Inspect all seals. Replace any seals that are cut, worn or otherwise have a doubtful remaining service life.

c. Inspect all bearings for cracks, nicks, galling, brinelling, etc. Replace all parts that are defective or have a doubtful remaining service life.

d. Check bearing surfaces for evidence of bearings turning on the shaft. If bearing Inner race is turning, check concentricity of the shaft. Repair or replace if found to be eccentric or badly worn. Slight imperfections of the shaft may be removed with fine sandpaper. Check the roller bearing surfaces of the shaft for nicks, galling and cracks. Repair or replace shaft if any of these are found or if a definite step can be felt between the worn and unworn surfaces when checked with fingernail.

e. Clean the shaft cavity of the drums with solvent and dry thoroughly.

9-95. REASSEMBLY OF AXLE SHAFT ASSEMBLY.

a. Lubricate all bearing cup bores (four), then install bearing cups (one inner and outer cup per drum) into the drums. Be sure cups are firmly seated (see figure 9-102).

b. Install inside bearing cones and grease seals into inside hubs on both drums (see figure 9-103).

c. Insert center spacer on shaft and install locking pins (see figure 9-104).

d. Install shim(s) in original location (see step e, paragraph 9-101). Insert shaft assembly Into one drum, then insert the other drum into the other side of the shaft assembly (see figure 9-105).

e. Install outer bearing, grease seal, and outer solid spacer into each drum (see figure 9-106).

f. Install split spacers, thrust washers, and slotted nuts (see figure 9-107).

g. Working at each end separately, torque slotted nut to 200 ft.-lbs. (27.7 kg-m); back off to 25 ft.-lbs. (3.5 kg-m), then retorque to 45 ft.-lbs. (6.3 kg-m) or next higher slot. Install cotter pin (see figure 9-108).

NOTE: Ensure that the drums are on a flat, level surface. Placing one drum on a pallet and the other drum supported with a lift truck or hand dolly will allow the drums to easily assemble together.

h. Check to see If clearance between guide rolls is within specifications. If correct clearance does not exist, remove one drum and adjust shim pack between center spacer and bearing to maintain .010 - .030 in. (.25 - .76 mm) clearance (see figure 9-109).

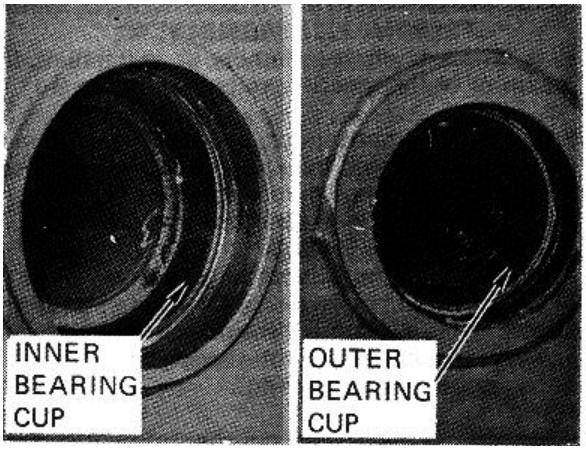


FIGURE 9-102.

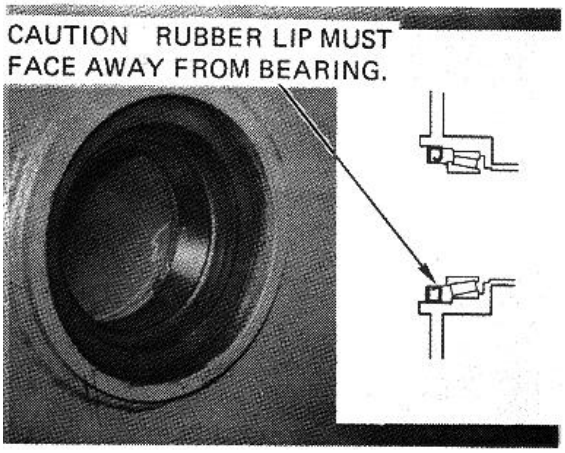


FIGURE 9-103.

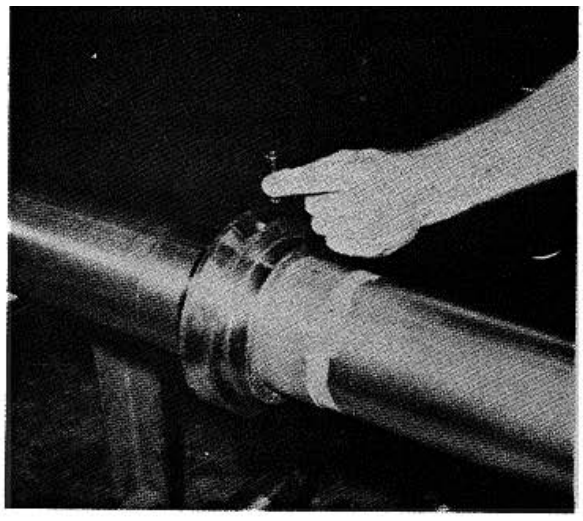


FIGURE 9-104.

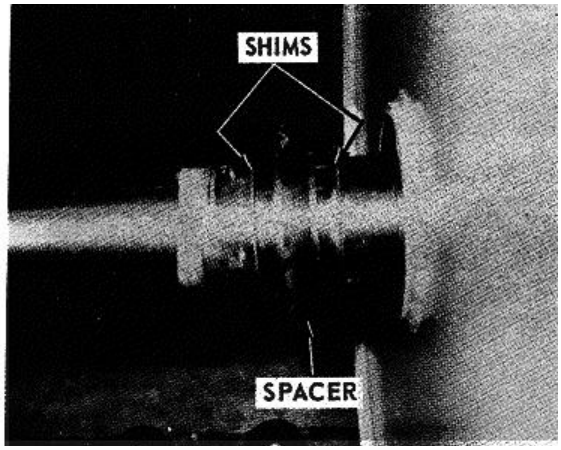


FIGURE 9-105.

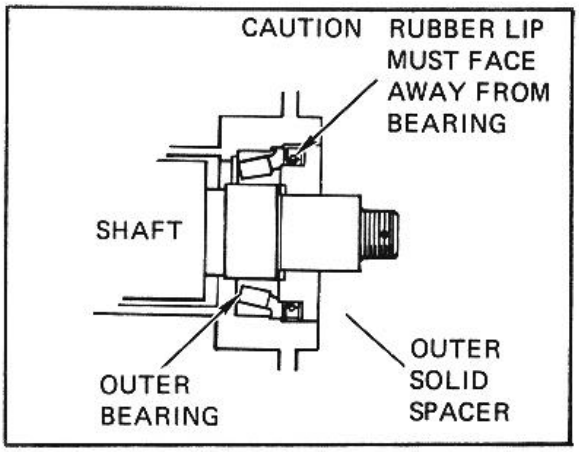


FIGURE 9-106.

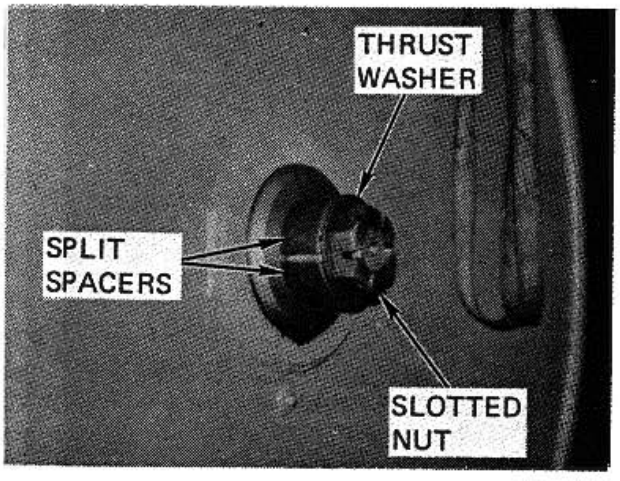


FIGURE 9-107.

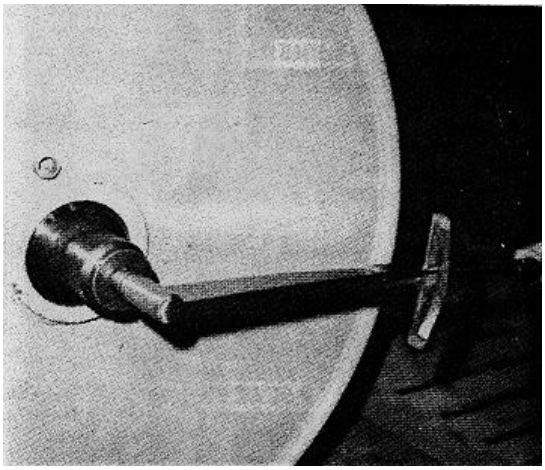


FIGURE 9-108.

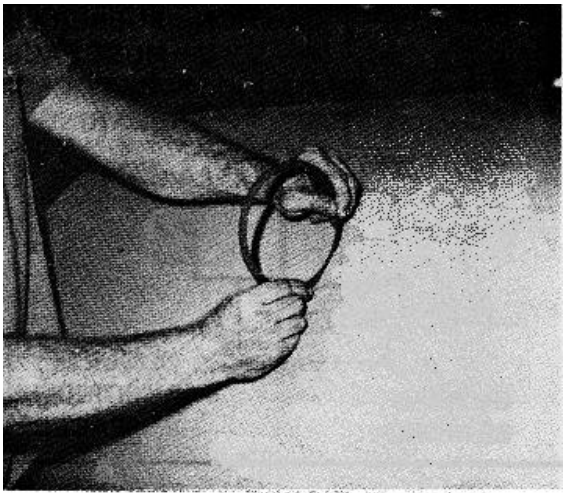


FIGURE 9-109.

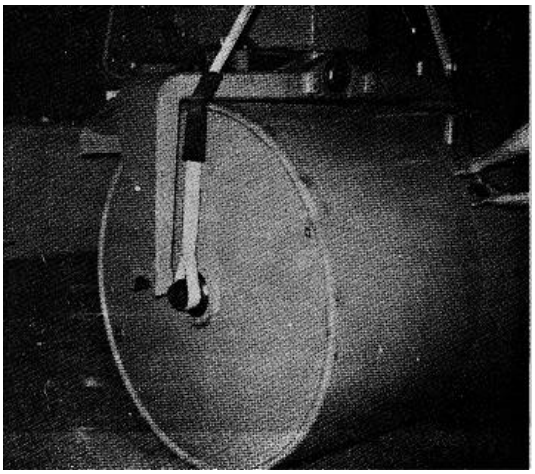


FIGURE 9-110.

9-96. INSTALLATION OF GUIDE ROLLS AND STEERING AXLE ASSEMBLY.

a. Lift axle shaft assembly so it parallels the position of the steering yoke (see figure 9-110).

b. Lift the gooseneck up until the steering yoke clears the axle shaft spacers. Then carefully roll the guide rolls until yoke is directly over the axle shaft (see figure 9-111).

c. Position the spacer slits so they line up with the slits between the caps and the steering yoke. Remove the frame blocking and lower the gooseneck until the axle shaft carries the weight (see figure 9-112).

d. Install each cap on the original side it was removed from. Be sure groove (larger I. D.) is to the outside (see figure 9-113).

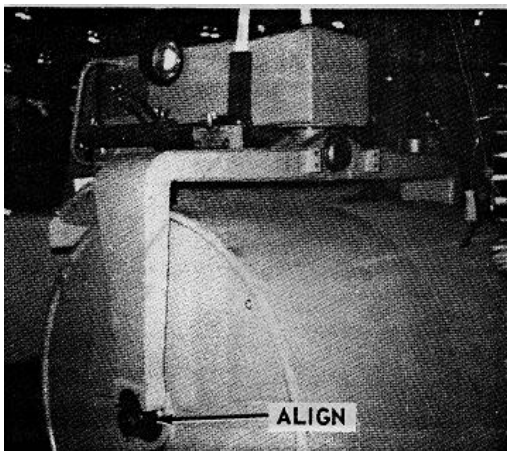


FIGURE 9-111.

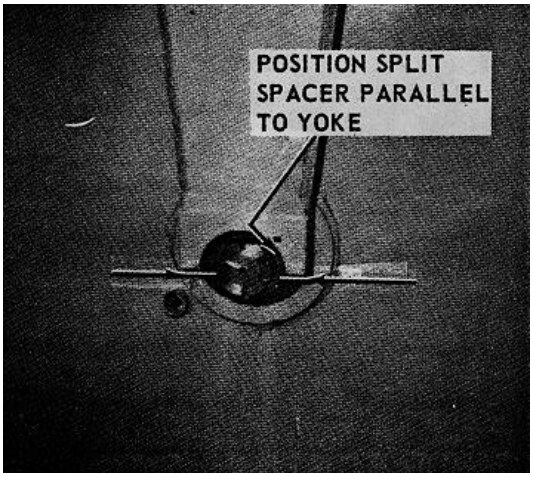


FIGURE 9-112.

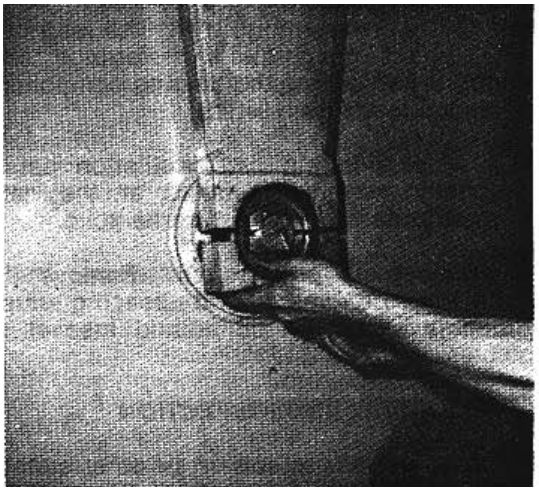


FIGURE 9-113.

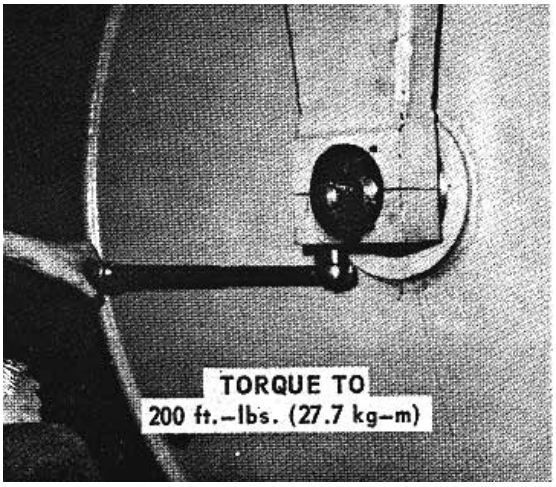


FIGURE 9-114.

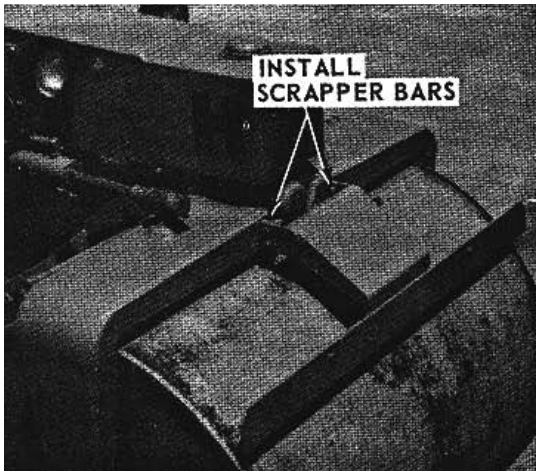


FIGURE 9-115.

e. Torque the capscrews to specification (see figure 9-114).

f. Install the front scraper bar. Lubricate the axle shaft assembly (refer to Section 4). See figure 9-115.

9-97. REMOVAL AND DISASSEMBLY OF YOKE AND KING PIN ASSEMBLY.

NOTE: Remove axle shaft assembly from unit by following procedures outlined in paragraph 9-91. Then proceed as follows:

a. Remove scraper bar and coco mat assembly, water spray manifold and disconnect steering cylinder ball joint assembly (see figure 9-116).

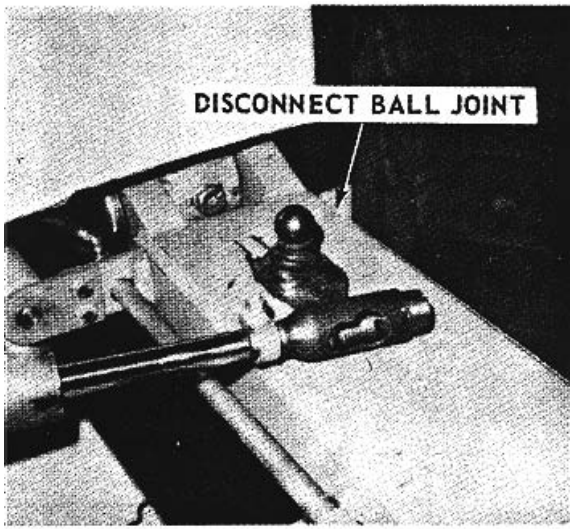


FIGURE 9-116.

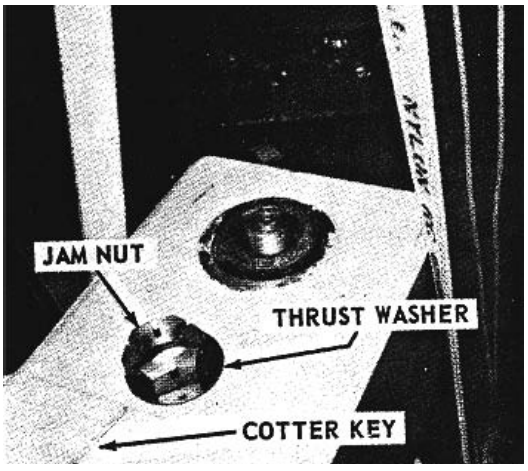


FIGURE 9-117.

b. Support yoke with a hoist or lift truck. Then remove king pin dust cover, cotter pin, jam nut, and thrust washer (see figure 9-117).

WARNING: Be sure unit is securely blocked.

c. Lower yoke assembly onto the floor, then remove both king pin bearings and the seal. Tag bearings for reassembly with Its respective cup. Inspect bearings and replace both king pin bearing assemblies if any one; of the bearing components is damaged (see figure 9-118).

d. Remove oscillation pin dust covers, cotter keys, jam nuts, and thrust washers, then remove locking bolt (see figure 9-119).

e. Remove oscillation pin and bearings. Tag bearings for reassembly with its respective cup. Inspect bearings and replace both bearings if any one of the bearing components is damaged (see figure 9-120).

NOTE: Mark king pin and oscillation pin so they may be installed at the same attitude with respect to the yoke.

f. Lift out the king pin. Remove the oscillation pin seals and bearing cups. Thoroughly clean the bores and inspect for damage (see figure 9-121).

9-98. CLEANING AND INSPECTION.

a. Clean all parts in solvent or other suitable cleaning agent. Dry thoroughly with compressed air or clean lint-free cloth. If parts are not

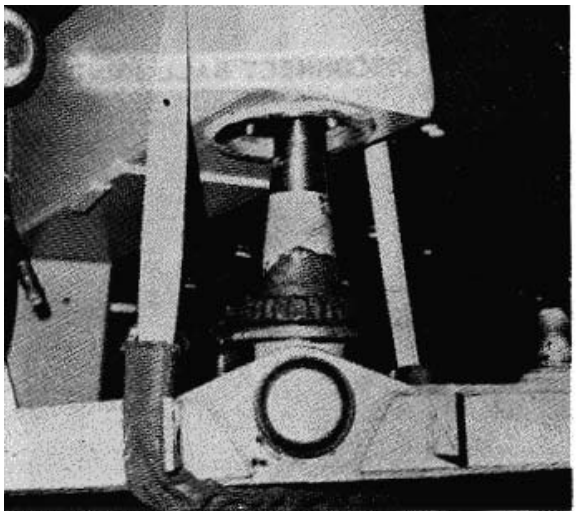


FIGURE 9-118.

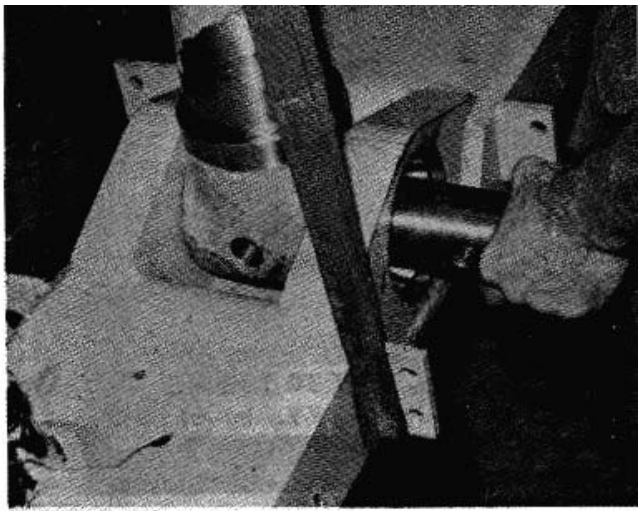


FIGURE 9-120.

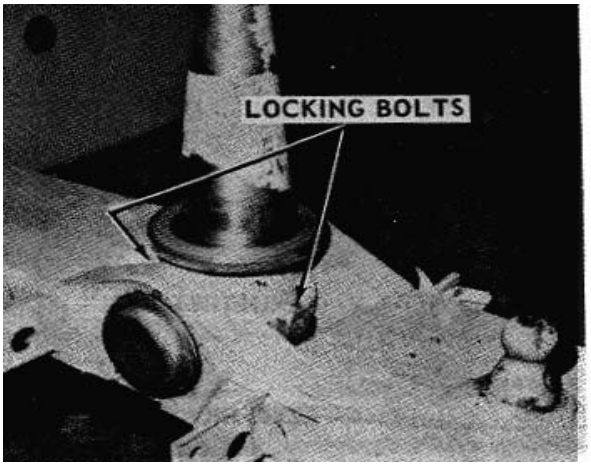


FIGURE 9-119.

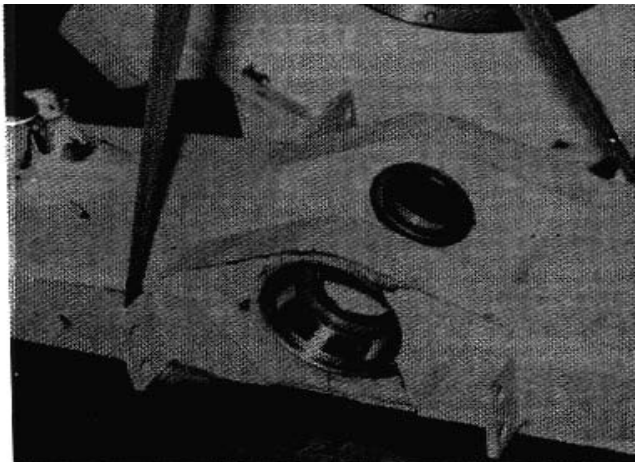


FIGURE 9-121.

to be assembled immediately, coat all machined surfaces with clean oil and cover.

b. Inspect all seals. Replace all seals that are cut, worn or otherwise have a doubtful remaining service life.

c. Inspect all bearings for cracks, nicks, galling, brinelling, etc. Replace all parts that are defective or have a doubtful remaining service life.

d. Check bearing surfaces for evidence of bearings turning on the shaft. If bearing inner race is turning, check concentricity of the shaft. Repair or replace if found to be eccentric or badly worn. Slight imperfections of the shaft may be removed with fine sandpaper. Check the roller bearing surfaces of the shaft for nicks, galling and cracks. Repair or replace shaft if and of these are found or if a definite step can be felt between the worn or unworn surfaces when checked with fingernail.

e. Clean the inside of the gooseneck with solvent and dry thoroughly.

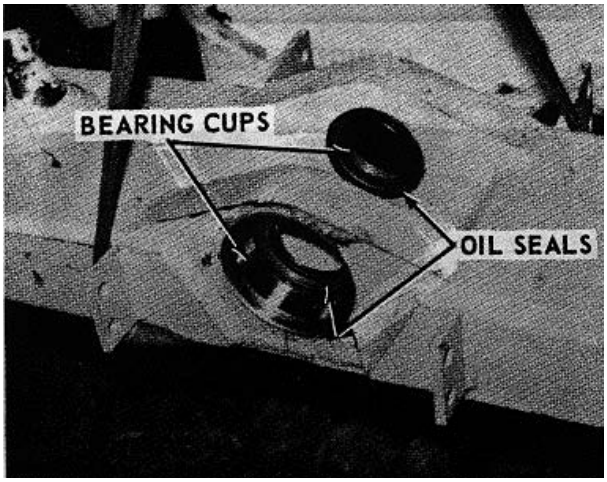


FIGURE 9-122.

9-99. REASSEMBLY AND INSTALLATION OF YOKE AND KING PIN ASSEMBLY.

a. Install bearing cups into gooseneck housing if removed during disassembly (see figure 9-122).

b. Pack bearing cones with Hyster Approved multipurpose grease.

c. Install bearing cone and oil seal into gooseneck (see figure 9-122).

d. Insert king pin into gooseneck and fill housing with Hyster approved multipurpose grease.

e. Install upper bearing cone washer and slotted nut (see figure 9-123).

f. Install bearing cups into yoke (see figure 9-1 24).

g. Insert oscillation pin into yoke and king pin. Install two locking bolts into oscillation pin and torque to 200 ft.-lbs. (27.7 kg-m). See figure 9-125.

h. Pack bearing cones with Hyster approved multipurpose grease and install two (2) washer and slotted nut on each end of the oscillation

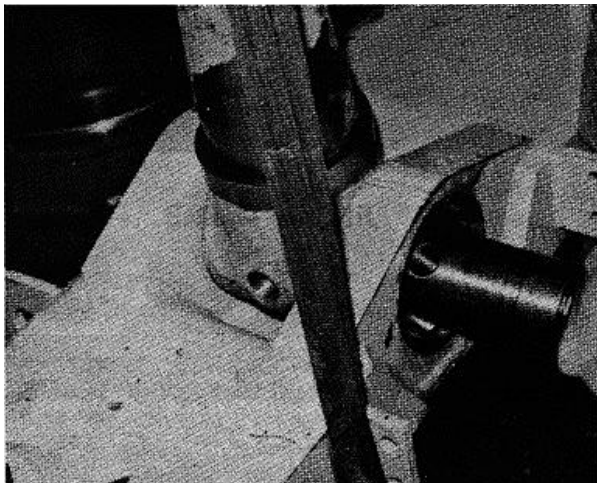


FIGURE 9-123.

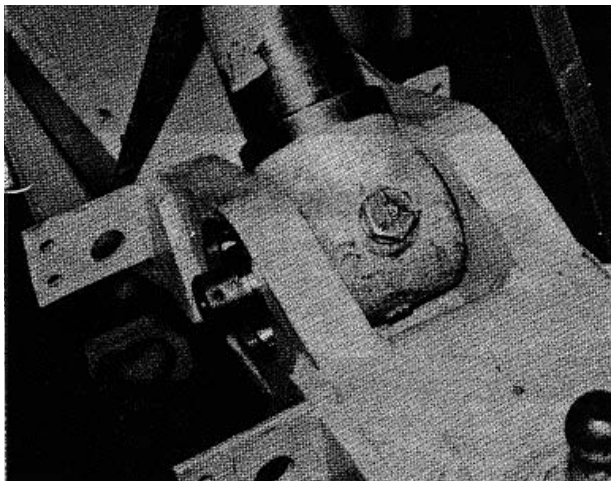


FIGURE 9-124.

pin (see figure 9-126). Tighten slotted nuts equally so that king pin remains centered on yoke. Torque one slotted nut to 200 ft.-lbs. (27.7 kg-m) lubed then back off to loose and retorque to 75 ft.-lbs. (10.4 kg-m). Check torque on opposite slotted nut. It should be 75 ft.-lbs. (10.4 kg-m).

NOTE: Check that running clearance exists on both sides of king pin. Adjust if necessary by repeating step h.

i. Install cotter keys into slotted nuts on both ends of the oscillation pin. Fill dust caps half full with Hyster approved multipurpose grease and install.

j. Install guide roll assembly (refer to paragraph 9-96).

k. Place unit on ground so that entire weight of gooseneck rests on king pin. Torque slotted nut to 200 ft.-lbs. (27.7 kg-m) lubed. Back off to loose and retorque to 75 ft.-lbs. (10.4 kg-m).

I. Install cotter key and fill dust cap half full with Hyster approved multipurpose grease and install.

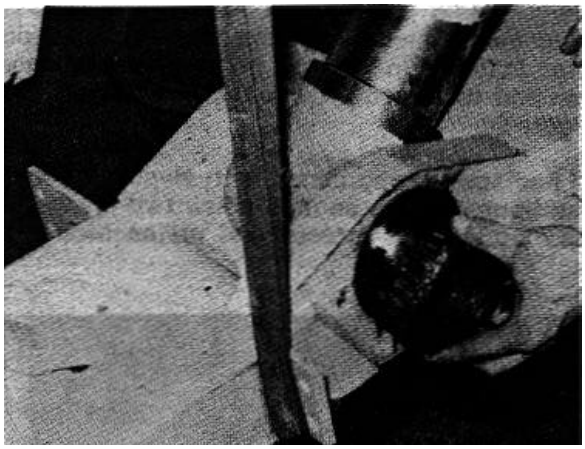


FIGURE 9-125.

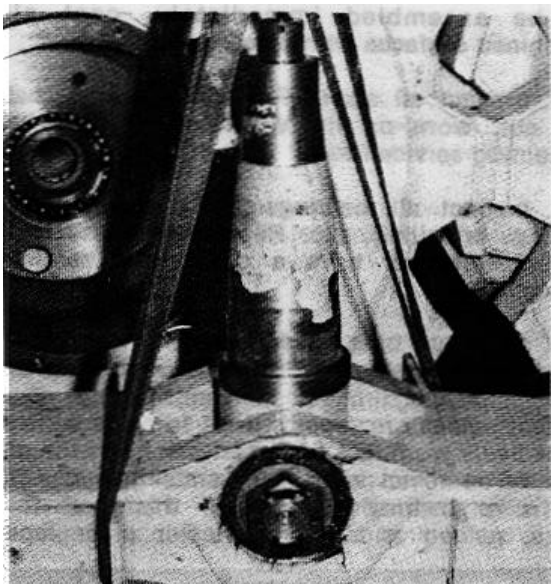


FIGURE 9-126A..

FIGURE 9-126B.

SECTION 10

10-1. GENERAL.

10-2. This section contains a description of the parking brake system and repair instruction for the brake drum assembly. Repair instructions include removal, inspection, and installation of the park brake assembly.

10-3. Design specifications are given in Section 2. Maintenance requirements are discussed in Section 4. Troubleshooting instructions are given in Section 5.

10-4. DESCRIPTION.

10-5. The parking brake is a mechanically operated friction brake mechanism that prevents the final drive from rotating. The braking mechanism is mounted on the left-hand side of the final drive housing. It is operated by a handlever mounted to the gooseneck. A flexible teflon coated steel cable connects the braking mechanism to the handlever. When the handlever is pulled, the cable retracts, operating an actuator lever which forces the brake shoe-type lining against the Inside of the brake drum. The brake drum is splined to the final drive shaft.

10-6. REMOVAL AND DISASSEMBLY (see figure 10-1).

10-7. Block guide roll and drive drums prior to removal of the brake drum assembly to prevent movement of the unit. Set the parking brake handlever to the brake applied position. Remove parking brake access cover located on the rear of the left-hand frame channel.

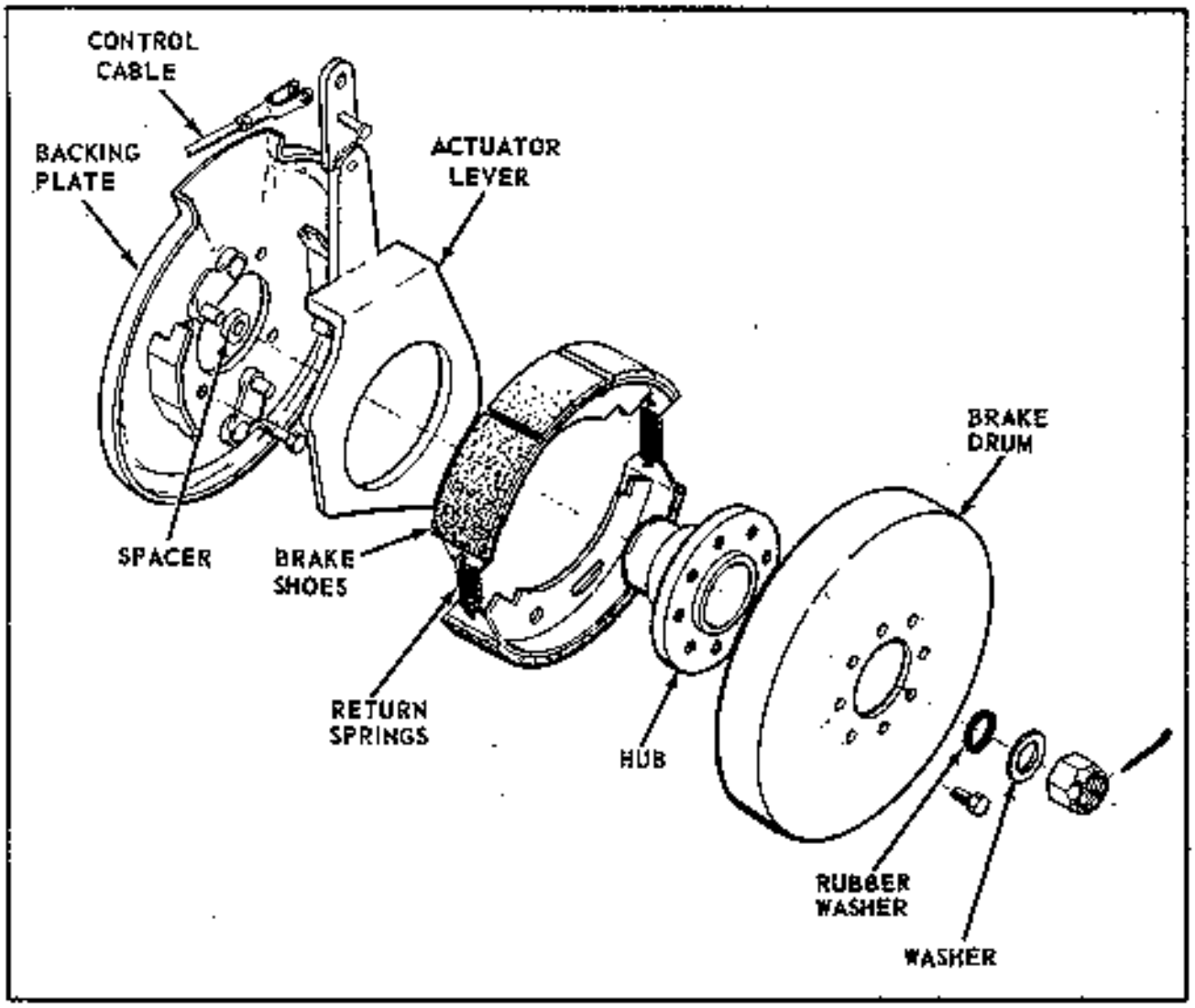


FIGURE 10-1.

a. Remove the brake drum capscrews, then release the parking brake control lever. Remove the brake drum.

b. Remove the brake shaft cotter pin, then remove slotted nut. Remove hub and spacer.

c. Disconnect and remove the brake return springs. Remove brake shoes.

d. Lift out the brake shoe actuator lever and disconnect the control cable.

e. Remove backing plate capscrews, then remove the backing plate.

10-8. CLEANING AND INSPECTION.

a. Use solvent to clean all metal parts except the brake shoe assemblies. The shoe rib and table can be wiped with a solvent dampened cloth. No solvent should get on the lining.

b. Examine drum for cracks, heat checks and deep grooves. The drums should not be bell-mouthed of barrel-shaped, nor should the mounting holes be elongated. If any of these conditions exist, the drum should be replaced. Glaze on the drum, which is otherwise in good condition, can be removed with coarse sandpaper .

c. The brake shoe linings should be replaced if worn to within 1115 inch (1.69 mm) or If bonding agent is failing. Do not attempt to save lining soaked with oil or with deep scores.

d. Check springs and discard them If broken, rusted, twisted, nicked or appear fatigued.

10-9. REASSEMBLY AND INSTALLATION.

CAUTION: Use only Hyster Approved replacement parts.

a. Install backing plate with actuator lever depression in position shown (see figure 10-2).

b. Install backing plate capscrews and torque to 49 ft.-lbs. (6.8 kg-m). Then install rollers on both actuator cranks (see figure 10-3).

c. Connect actuator lever to control cable, then position actuator lever into backing plate as shown (see figure 10-4).

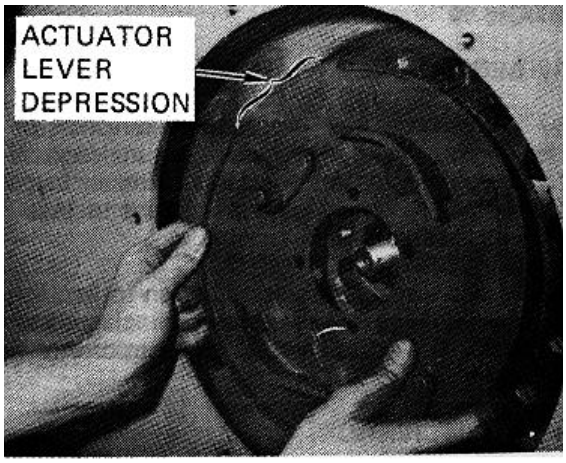


FIGURE 10-2.

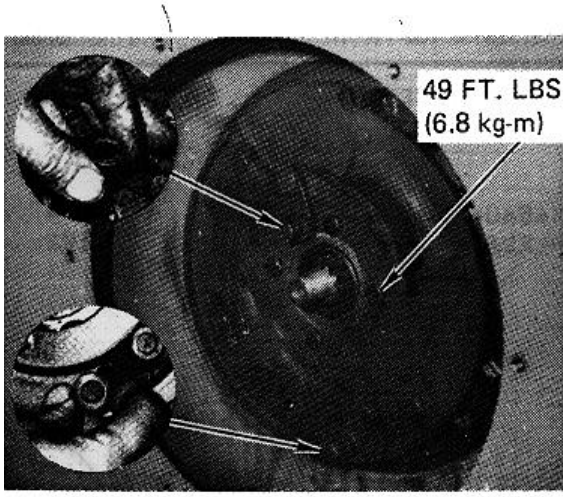


FIGURE 10-3.

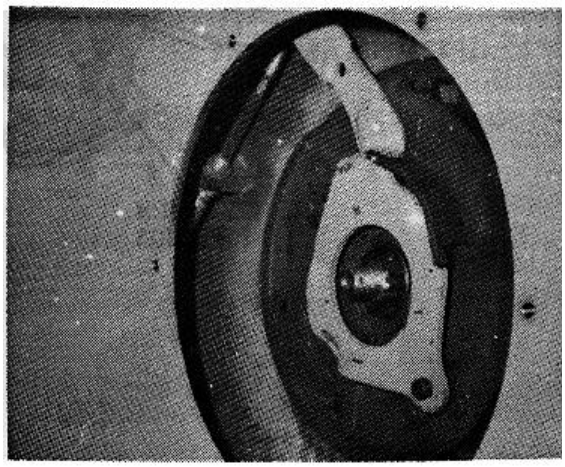


FIGURE 10-4.

d.

Next install brake hub, rubber seal, washer and slotted nut (see figure 10-5).Tighten slotted nut to remove end play. Back off one (1) flat (.012 in. - .305 mm loose). **DO NOT EXCEED 26 FT.-LBS. TORQUE**. Secure with cotter pin

e. Install brake shoes and return springs in position shown (see figure 10-6).

f. Install brake drum and torque capscrews to 49 ft.-lbs. (6.8 kg-m) (see figure 10-7).

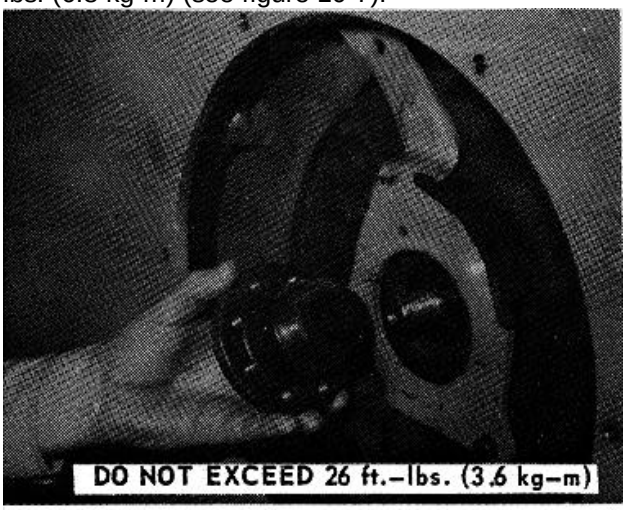


FIGURE 10-5.

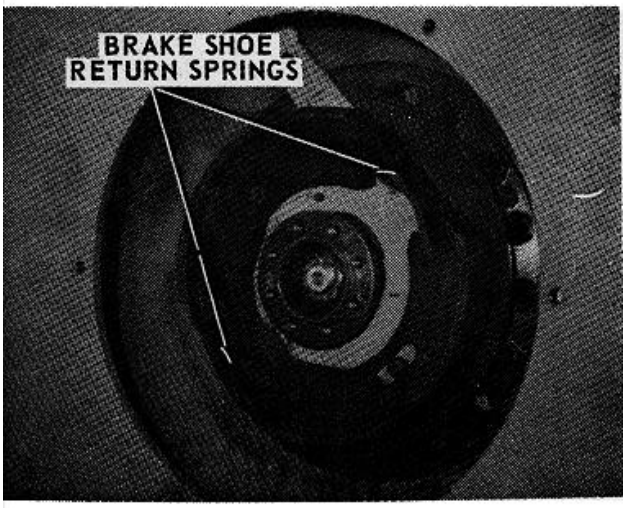


FIGURE 10-6.

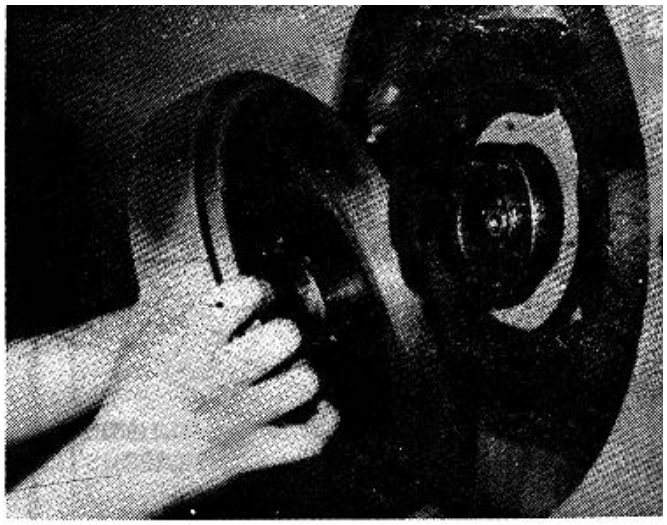


FIGURE 10-7.

10-10. ADJUSTMENT (see figure 10-8).

10-11. The parking brake handlever should be adjusted sufficiently to require at least 80 pounds (36.3 kg) to pull it into the applied position. Turn the adjusting knob on the handlever clockwise (lever in brake-off position) to increase force required to apply the brake.

10-12. Whenever the brake lining wears to the point where the brake cannot be adjusted with the handlever adjusting knob or when new lining is installed because of wear, another adjustment must be made. This adjustment is made in the linkage on the actuator lever end of the brake cable.

a. Disconnect the brake cable from the actuator lever and loosen the cable end jam nut on the cable.

b. Push the actuator lever arm until the shoes contact the brake drum. Adjust cable end until it aligns with the actuator lever arm in the shoe contact position.

c. Connect the cable to the actuator lever and adjust the handlever to obtain maximum braking power.

10-13. BRAKE LINING BREAK-IN PROCEDURE.

CAUTION: Break-in is essential to ensure adequate braking of the unit.

a. Jack the drive roll off the ground.

b. Warm up unit (Hydraulic oil temperature 100°F).

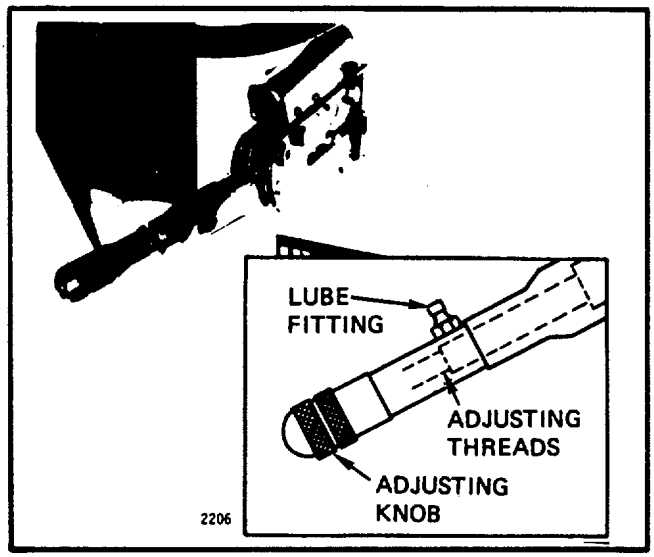


FIGURE 10-8.

c. Adjust brake handlever to 40 lb. (18.2 kg) pull.

d. (1)Using full throttle, gradually pull brake handlever "on" until transmission is almost to stall and hold for 5 seconds. (2) Release brake for 60 seconds and then repeat steps (1) and (2) 20 times.

e. Adjust brake handlever to 80 lbs. (36.3 kg) minimum pull.

11-1. GENERAL.

11-2. This section contains the water spray system description, checks, adjustment and service repair information. Refer to Section 2 for Water Spray System Specifications. Hyster-Care Maintenance Instructions are contained in Section 4 and a troubleshooting guide is presented in Section 5.

11-3. DESCRIPTION. (see figure 11-1).

11-4. The Water Spray System consists of a water tank, Inlet screen, sump filter, water pump and motor, spray manifolds (bars), associated lines and fittings, electrical switch and a circuit breaker. Refer to Section 6 for electrical schematic. The water pump is centrifugal type pump. The pump is mounted in a cavity recessed into the bottom of the water tank and accessible from under right- hand side of unit.

11-5. The Water Spray System is activated when the operator turns the water spray switch to the ON position. Once the motor is electrically energized it rotates the centrifugal pump. This causes the water to gravity feed from the tank into the pump, the pump then pressurizes the water to about 10 PSI (0.7 kglcm^2). Water then flows through the lines to the spray manifolds. Each manifold distributes the water to the drum(s).

11-6. The non-corrosive sump filter normally requires no maintenance because of the self-cleaning action of the water washing back and forth in the tank. The filter should be cleaned when the tank needs cleaning because of excessive accumulation of foreign material (see figure 11-2).

11-7. CHECKS AND ADJUSTMENTS.

11-8. SPRAY MANIFOLDS.

11-9. The water spray angle is adjusted by rotating the spray manifold. Check to see that the spray pattern completely covers the drum(s). Adjust the spray pattern so that spray

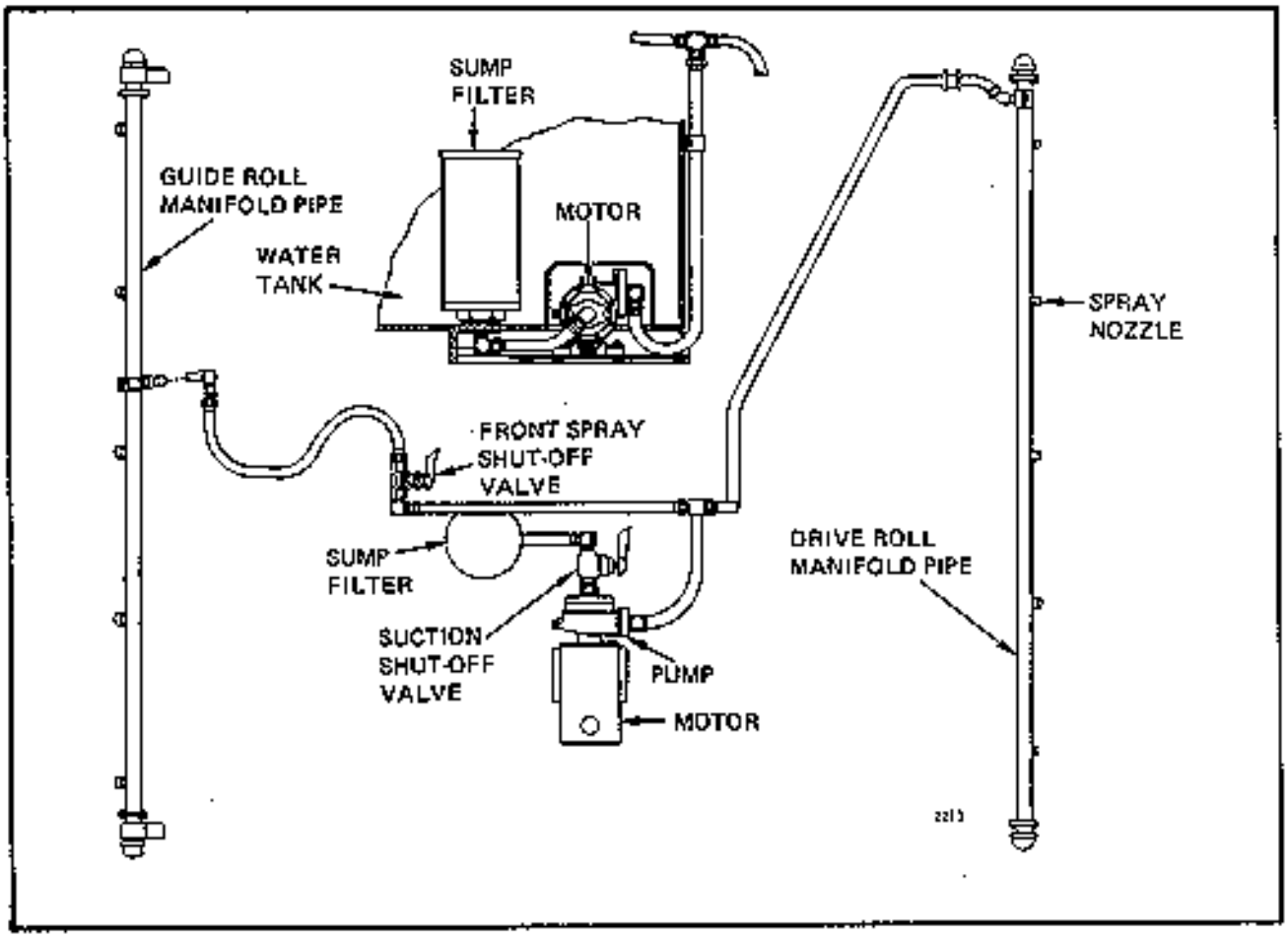


FIGURE 11-1.

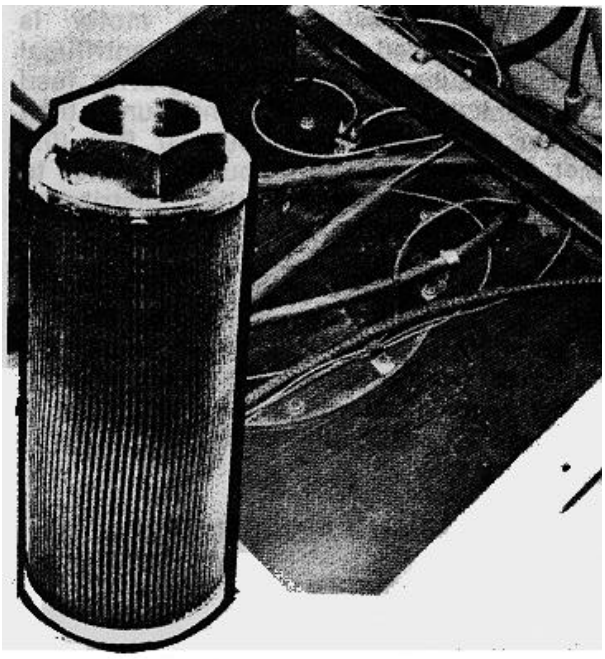


FIGURE 11-2.

strikes drum at upper edge of coco mat. Adjust as follows:

a. Loosen the manifold mounting U-bolts.

b. Rotate the manifold to give desired spray pattern.

c. Re-tighten the U-bolts when desired pattern adjustment is completed.

11-10. WATER PRESSURE.

11-11. Water pressure and flow can be varied by turning the (spray) control valve located in the operator's compartment directly below the steering wheel. If greater pressure is desired on the drive drum the front (guide roll) spray can be restricted by turning the shut-off valve located under the unit steering wheel.

11-12. CHECKING MOTOR BRUSHES (see figure 11-3).

WARNING: Be sure ignition key switch and water spray switch are in the OFF position before inspecting brushes.

11-13. To inspect the brushes, unscrew the brush retainers. Blow out any brush "dust" with compressed air. Check for at least 3/8 inch (9.5 mm) of brush length at the shortest point.

11-14. Examine the commutator for burns, pits or wear. The space between the segments should be clean and free of deposits. Replace motor if commutator is damaged.

11-15. REMOVAL OF PUMP AND MOTOR ASSEMBLY.

a. Turn the shut-off valve located at the pump under the unit (see figure 11-4).

b. Disconnect electrical wiring, pressure and suction lines (see figure 11-4).

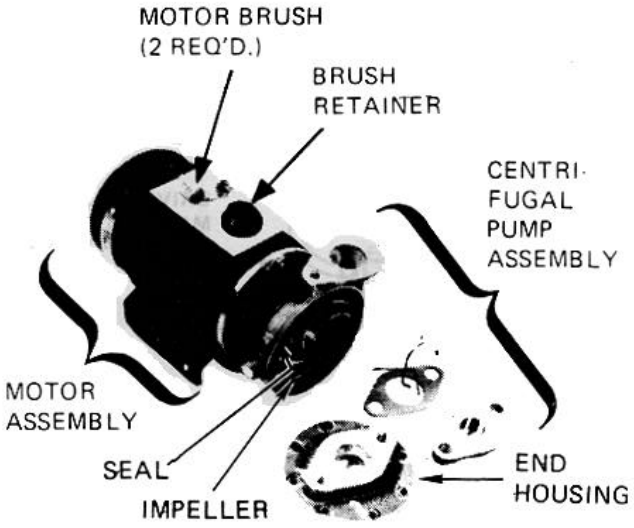


FIGURE 11-3.

c. Remove four (4) mounting plate capscrews and lower unit to floor.

WARNING: Support mounting plate during capscrew removal. DO NOT allow subassembly to fall.

11-16. REPAIR.

11-17. Determine if pump or motor has failed. Separate pump or motor and replace failed unit. Refer to CHECK MOTOR BRUSHES paragraph 11-12.

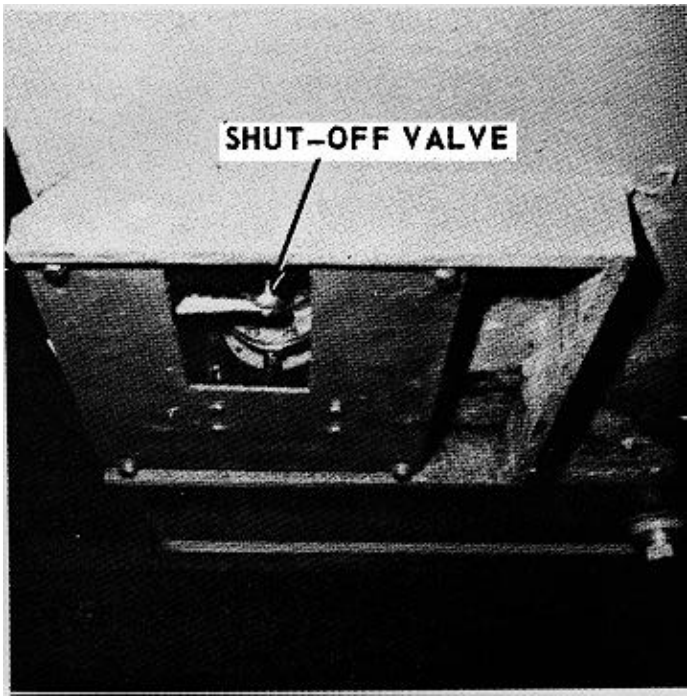
NOTE: The pump impellar is pressed on the armature shaft.

11-18. INSTALLATION OF PUMP AND MOTOR ASSEMBLY.

11-19. Install pump and motor assembly by reversing procedure presented in paragraph 11-15.

11-20. CLEANING THE WATER TANK.

a. Drain the water tank for periodic cleaning by removing the drain plug located under the unit (see figure 11-5). An access plate Is located at the front of the unit frame.



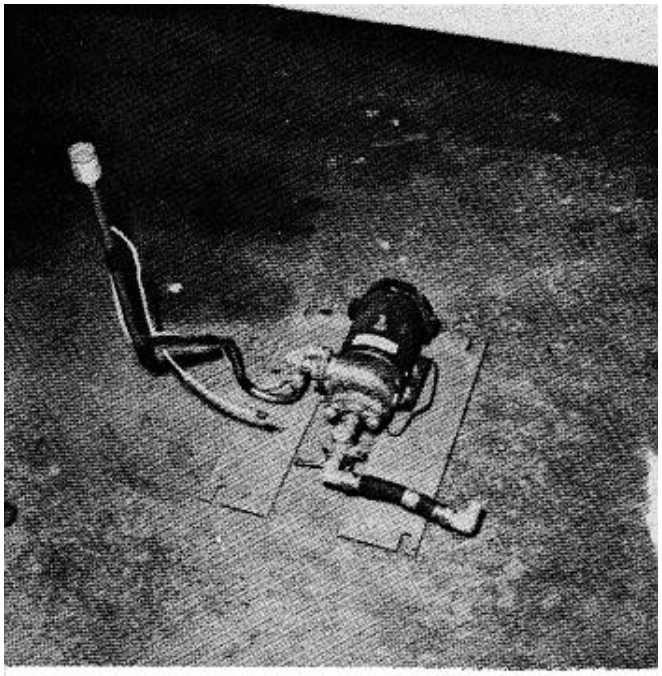


FIGURE 11-4.

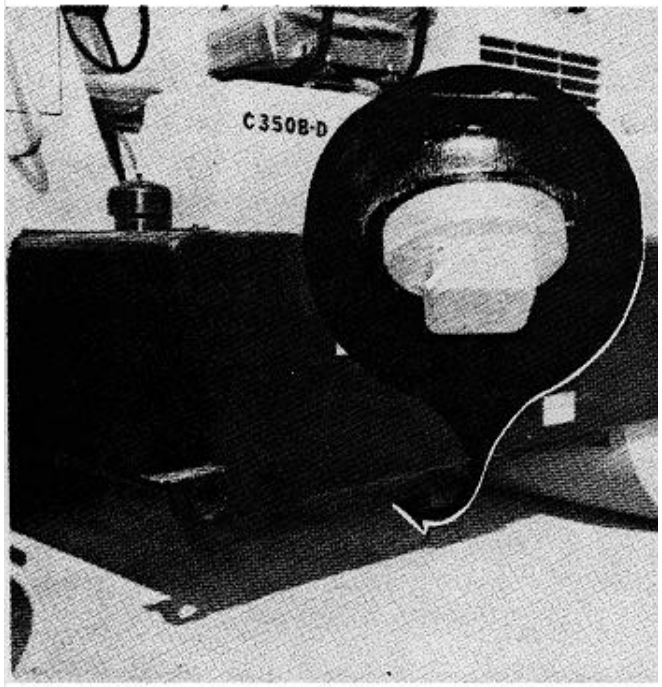


FIGURE 11-5.

NO MATTER HOW YOU SAY IT...

La Prudence Paye
La Seguridad Paga
Betriebssicherheit Macht Sich Bezahlt
Passaa Olla Huolellinen
Veiligheid Voor Alles
Säkerhet Först
Essere Sicuro Paga
Segurança Paga
Sikkerhet Først
Pinter Be Awas

सावधान और ज़िन्दा रहो !

في التأني السلامة

用心無難

SAFETY PAYS!

PART II
SUPPLEMENTAL OPERATING MAINTENANCE
AND
REPAIR PARTS INSTRUCTIONS

STEEL WHEEL ROLLER C350B

CONTRACT NO. DSA 700-74-C-9024

SUPPLEMENTAL OPERATING MAINTENANCE AND REPAIR PARTS INSTRUCTIONS

FOR

ROLLER, MOTORIZED, STEEL WREEL 2 DRUM TANDEM 10-14 TON
MODEL C350BD
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*This publication superseded USMP 5-3895-348, dated Jul 76.

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SECTION I

GENERAL

1-1. Purpose. To provide User and Support personnel supplemental maintenance and repair parts instructions that have special application to Commercial Construction Equipment (CCE) items.

1-2. Scope. This publication applies to Department of the Army Units, Organizations and Activities that use and/or support the CCE Roller Motorized Steel Wheel, 10-14 Ton.

1-3. CCE Item. The term "CCE" Item used in this publication applies to a standard commercial item of commercial equipment that has been approved for a specific TOE requirements and is procured and supported under the CCE System Plan. This plan permits maximum utilization of the civilian construction industry's competitive research and develop- ment, manufacturer's equipment publications and commercial sources for repair parts.

1-4. Description. The CCE Roller Steel Wheel is manufactured by Hyster Co. of Kewanee, IL. It is powered by an in-line three cylinder (3-53 series) Detroit Diesel Engine. The final drive consists of an internal, double reduction planetary system located within the left side of the single drive drum. Engine power is transferred to the final drive assembly by a closed hydrostatic transmission system. The steering system is a hydrostatic operated, manually controlled system, with provi- sions for manual steering.

1-5. Operational Concept. The CCE Roller, Steel Wheel will be deployed worldwide as a replacement for the following: 5-8 Ton Roller (LIN S1068), 8-12 Ton Roller (LIN S11136), 9-14 Ton Roller (LIN S11205) and (LIN S11273). It will also partially replace the 10 Ton Roller listed under LINs S11479 and S11616.

The Roller is intended for use in road construction and rehabilitation, airfield, heliport and port construction. Primary tasks are breakdown and finish rolling asphalt pavements and asphalt patch work. Secondary uses are compaction of pavement base courses and stabilized bases and pavements.

1-6. Procurement Status. The procurement contract number is DSA 700-74-C-9024 and was awarded June 1974.

1-7. Equipment Publications.

a. Initially two sets of the manufacturer's commercial publications will be overpacked and shipped with each Roller (reference Appendix A).

b. Additional commercial manuals may be obtained by requisitioning from Defense Construction Supply Center (DCSC). Requisitions to DCSC should be prepared in the same manner as for part numbered repair parts, using the Federal Supply Code for manufacturer' s FSCM and manual numbers listed in Appendix A. If DD Form 1348-6 is used, mail it direct to Commander, DCSC, ATTN: DCSC-OSR, Columbus, OH 43215.

c. If additional assistance is required, contact the address in paragraph 1-11 of this publication.

1-8. Personnel and Training.

a. MOS Requirements:

(1) Operator: 62J20, General Construction Machine Operator.

(2) Organizational Maintenance: 62B20, Construction Equipment Repairman.

(3) Direct and General Support Maintenance: 62B30, Construction Equipment Repairman; 63G20, Fuel and Electrical Systems Repairman, 44B20 Metal Body Repairman.

b. New Equipment Training: New Equipment Training Teams (NETTs) are available to major field commands. Requests for NETTs should be forwarded to Commander, US Army Tank-Automotive Materiel Readiness Command (TAROOM), ATTN: DRSTA-MLT, Warren, MI 48090. Training teams should be requested only when trained personnel are not available in the command to operate and/or maintain the Roller.

1-9. Logistics Assistance.

a. Tank-Automotive Command Field Maintenance Technicians stationed at CONUS and OCONUS installations will be fully qualified and available to furnish on-site training and or assistance concurrent with receipt of the Roller.

b. Assistance can be obtained by contacting the Logistics Assistance Office listed in Appendix B or AR 700-4.

1-10. Warranty. The CCE Roller contractor warrants the products furnished under this contract according to the terms and conditions described in the equipment publications and Appendix B of this publication . All

warranties furnished to the Roller contractor by subcontractors of assemblies or components utilized in the manufacture of the end item will be extended to the Government. See Appendix B for warranty guide-lines.

1-11. Reporting. You can improve this publication by recommending improvements, using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and mail direct to Commander, US Army Tank-Automotive Materiel Readiness Command, ATTN: DRSTA-MVB, Warren, MI 48090.

SECTION II

MAINTENANCE

2-1. Maintenance Concept. The CCE Roller will not require any new or special maintenance considerations. All maintenance functions can be accomplished within the current maintenance concepts established for construction equipment.

a. Operator/Crew Maintenance: Operator and crew maintenance is limited to daily preventive maintenance checks and services.

b. Organizational Maintenance: Organizational maintenance consists of scheduled preventive maintenance services, minor repairs and adjustments.

c. Direct Support Maintenance: Direct support maintenance consists of repairs on-site or in a direct support unit's shops. Repairs are accomplished with a minimum of tools and test equipment; the assemblies and end items thus repaired are returned to their users.

d. General Support Maintenance: General support maintenance overhauls selected assemblies and repairs items designated by the area support command for return to stock.

e. Depot Maintenance: Depot Maintenance overhauls end items and selected major assemblies when they are required to satisfy overall Army requirements. Overhaul of the end item may also be performed by contract with the manufacturer.

2-2. Maintenance Allocation Chart. Maintenance will be performed as necessary by the category indicated in the Maintenance Allocation Chart (MAC) (Appendix C) to retain or restore serviceability. All authorized maintenance within the capability of a using organization will be accomplished before referring the item to support maintenance. Higher categories will perform the maintenance functions of lower categories when required or directed by the appropriate Commanders. Using and support units may exceed their authorized scope and functions in the

MAC when approval is granted by the next higher support maintenance Commander.

2-3. Modifications. Modifications will be accomplished by the end item manufacturer after TARCOM approves the field campaign or modification plan. See Appendix D.

2-4. Equipment Improvement Recommendations (EIR). Equipment Improvement Recommendations will be submitted in accordance with TM 38-750.

2-5. Equipment Readiness Reporting. Readiness Reporting will be accomplished as required by the current TM 38-750.

2-6. Maintenance Expenditure Limits. The average life expectancy for the Roller is 15 years.

PERCENT OF REPAIR	YEAR
50%	1982
45%	1985
40%	1987
35%	1989
30%	1991
20%	1993
100	1994

2-7. Shipment and Storage.

a. Shipment and Storage. Refer to TB 740-97-2 for procedures covering preservation of equipment for shipment and storage.

b. Administrative Storage. Refer to TM 74D0-90-1 for instructions covering administrative storage of equipment.

2-8. Destruction to Prevent Enemy Use. Refer to TM 750-244-3 for procedures covering destruction of equipment to prevent enemy use.

2-9. Fire Protection.

a. A hand operated fire extinguisher may be installed at the discretion of the using unit.

b. Approved hand-portable five extinguishers are listed in TB 5-4200-200-10.

2-10. Basic Issue Items List (BILL). See Appendix E for a list of items which accompany the end item or are required for operation and/or operator's maintenance.

2-11. Maintenance and Operating Supply List. See Appendix L for a list of maintenance and operating supplies required for initial operation.

2-12. Special Tools and Equipment. No special tools or equipment are required for operation and maintenance of the Roller.

2-13. Maintenance Forms and Records. Operational, Maintenance and Historical records will be maintained as required by the current TM 38-750.

2-14. Towing the Roller. Before towing a unit that has malfunctioned ensure that the transmission by-pass valve is in the open position and park brake has been released. The by-pass valve is located under the hood next to the batteries. After towing be sure that the b-pass valve has been closed.

CAUTION: The by-pass valve is not intended for towing a unit from one job site to another. Tow at speeds of one (1) to (2) MPE for as short a distance as possible.

2-15. Starting the Roller.

a. Always set the park brake by moving the control lever to BRAKE ON position (up).

b. Place the Direction-Throttle Bail in Neutral detented position (vertical).

c. Start engine.

2-16. Safety Precautions. Always observe the following safety pre-cautions to prevent possible injury to personnel and damage to the equipment.

a. TRAINED OPERATIONS ONLY.

b. Always use slower unit speeds and added caution when operating close to a lift edge or when traveling downhill.

c. Never travel across a slope. Always travel up or down a slope.

d. Always engage the parking brake before dismounting the unit.

e. Never shut down the engine when traveling up or down a slope

Always move the Direction-Throttle Bail toward the neutral position to slow the unit.

SECTION III

REPAIR PARTS SUPPLY

3-1. General.

a. The basic policies are procedures in AR 710-2, AR 725-50 and DA Cir 700-27 are generally applicable to repair parts management for CCE items.

b. Manufacturer's parts manuals are furnished with CCE items instead of Department of the Army Repair Parts and Special Tool List (RPSTL).

c. National Stock Number (NSNs) are initially assigned only to PLL/ASL parts and major assemblies, i.e. engines, transmissions, etc. Additional NSNs are assigned by the supply support activities as demands warrant.

d. Proper use of project codes and weapon systems designator codes on parts requisitions is essential.

e. Automated Processing (AUTODIN) of Federal Supply Code Manufacturer (FSCM) part number requisitions, without edit for matching NSNs and exception data, is authorized.

f. Repair parts are available from commercial sources and may be purchased locally in accordance with AR 710-2 and AR 734-110.

g. Initial Prescribed Load List (PLL) and Authorized Stock List (ASL) will be distributed by US Army Tank-Automotive Materiel Readiness Command, (TARCOM), ATTN: DRSTA-FH.

3-2. Prescribed Load List (PLL). The PLL distributed by TARCOM is an estimated 15 days supply recommended for initial stockage at organizational maintenance. Management of PLL items will be governed by the provisions of AR 710-2 and local command procedures. Selection of PLL parts for shipment to CONUS/OCONUS units is based upon the receiving Command's recommendation after their review of the TAROOM prepared list. Organizations and activities in CONUS/OCONUS will establish PLL stocks through normal requisitioning process.

3-3. Authorized Stockage List (ASL). The ASL distributed by TARCOM is an estimated 45 days supply of repair parts for support units and activities. The ASL parts will be shipped according to the recommendations of the receiving commands, after they have reviewed the initial list distributed by TARCOM. Support units and activities in CONUS/OOONUS will establish ASL stocks through normal requisitioning process.

3-4. Requisitioning Repair Parts.

a. Using Units/Organizations: Requisitions (DA Form 2765 Series) will be prepared according to AR 710-2 and local command directives. All requisitions will have the Weapons System Designator code "BD" (Interim Change 5-1, AR 710-2 per DA Message, DALO-SMS 091400Z Jun 78) entered in the 2nd and 3rd positions of block 18. Units in CONUS will use project code "BGW" in block 19. Units OCONUS will enter in block 19 project code "JZC", Appendix H.

b. Support Units and Activities:

(1) General: All MILSTRIP requisitions (DD Form 1348 Series) prepared for repair parts support of CCE items will include distribution and project codes, see Appendixes I, J and K.

(2) Distribution Code: Supply customers in CONUS will use code "F" in card column 54. Customer OCONUS will use the appropriate code from Appendix P, paragraph P-3a(1) AR 725-50. Weapons System Designator code "BD" (DA Message 091400Z, DALO-SMS, June 78), will be entered in card columns 55 and 56 of all requisitions for parts to support the roller.

(3) Project Codes: The applicable project code will be entered in card columns 57-59 of requisitions for Non-NSN parts, whether CONUS or OCONUS customers. Project code "BGW" will be used by CONUS customers when requisitioning part numbered parts. Supply customers OCONUS will use project code "JZC" for part numbered parts.

3-5. Submitting Requisitions.

a. Using Units and Organizations will submit DA Form 2765 Series requisitions to designated support units or activities in accordance with local procedures.

b. Support units and activities will forward MILSTRIP requisitions for NSN parts through the Defense Automated Addressing System (DAAS) to the Managing Supply Support Activity. Requisitions for part numbered part will be forwarded through DAAS to the Defense Construction Supply Center (DCSC).

NOTE: When the manufacturers part number and Federal Supply Code for Manufacturer (FSCM) exceed the space in card columns 8 through 22 of A02/AOB requisitions, prepare an A05/AOE requisition (DD Form 1348-6) and mail it to Commander Defense Construction Supply Center, ATTN: DCSC-OSR; Columbus, OH 43215.

APPENDIX A

REFERENCES

A-1. Publications

Logistic Assistance Program AR700-4
Material Management for Using Units, Support Units and Installations ..... AR 710-2
Requisitioning Receipt and Issue System ..... AR 725-50

Indexes should be consulted frequently for latest change of revisions of references and for new publications relating to material covered in this publication.

Index of Administrative Publications.....DA PAM 310-1
Index of Blank Forms .....DA PAM 310-2
Index of Doctrinal Training and Organization Publications.....DA PAM 310-3
Index of Technical Manuals Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins and Lubrication Orders.....DA PAM 310-4
Index of Graphic Training Aid and Devices .....DA PAM 310-5

A-2. Forms

Refer to TM 38-750, The Army Maintenance Management System (TAMMS), for instructions on the use of maintenance forms pertaining to the materiel.

A-3. Other Publications

The following publications contain information pertinent to the major item and associated equipment.

a Camouflage.

Camouflage .....FM 5-20

b. Decontamination.

Chemical, Biological, and Radiological (CBR) Decontamination.....TM 3-220
NBC (Nuclear, Biological and Chemical) Defense .....FM 21-40

c. General.

Utilization of Engineer Construction Equipment.....TM 5-331A
Basic Cold Weather Manual.....FM 31-70
Northern Operations.....FM 31-71
Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -650 F).....FM 9-207
Procedures for Destruction of Equipment to Prevent Enemy Use .....TM 750-244-3

d. Maintenance and Repair

Inspection, Care and Maintenance of Antifriction Bearings .....TM 9-214
Welding Theory and Application.....TM 9-237
Hand Portable Fire Extinguishers Approved for Army Users.....TB 5-4200-200-10

e. Administrative Storage.

Administrative Storage of Equipment .....TM 740-90-1
Preservation of USAMECOM Mechanical Equipment for Shipment and Storage..... TB 740-97-2

APPENDIX B

WARRANTY GUIDELINES

1. A warranty period of 12 months applies to the Roller, Motorized, Steel Wheel, Model C350B-D, Contract Number DSA 700-74-C-9024, manufactured by HYSTER Co. after delivery to the Government. This warranty applies to the end item, components and all supplies furnished under the contract.

2. Using units may not contact their local dealer. You must mail DA Form 2407 to the Maintenance Directorate, TARCOM, at the following address: US Army Tank-Automotive Material Readiness Command, ATTN: DRSTA-MVB, Warren Michigan 48090. To expedite actions you may call the information to AUTOVON 273-3349 or 273-3439 with the information from your DA 2407, section 1, block 1 through 11, blocks 16, 17, 18 and 20.

3. General information:

a. DA Form 2407 (prepared in accordance with warranty claim actions in TM 38-750) will be used to submit warranty claim actions for end items when components, parts or assemblies are defective and are covered by a manufacturer's warranty. End items under warranty are identified by a decal plate and/or warranty statement included in the operator's and maintenance manual for the end item. All warranty actions settled or unsettled will be reported to the National Maintenance Point (NMP) on DA Form 2407. For warranties settled locally the DA Form 2407 will contain a statement "For Information Only" in block 35.

b. Maintenance activities in support of organizational maintenance are the responsible points of contract between the originator of warranty claims and the National Maintenance Point (US Army Tank-Automotive Material Readiness Command, DRSTA-MVB, AUTOVON 273-3349, or 273-3439 Warren, Michigan 48090, which serves as the DA Representative with the contractor in warranty matters.

NOTE: In certain instances, the originating organization and the support activity are one and the same.

c. Before you take your equipment to a dealer for repair, whether or not it was necessary for you to go through the NMP (TARCOM), check with your local procurement office to see if a funds commitment document is needed. Sometimes, even though the majority of the repairs are covered by the warranty, there may be a small charge for normal maintenance costs, i.e., oil filters, oil, etc. Further, the cause of damage could be determined by the dealer to be directly related to "operator abuse." In that case, the Government may be obligated to pay for tear-down services even if the repairs are no longer desired, or for the complete cost if repairs are to be completed by the dealer.

d. When the equipment is given to the dealer for repairs, find out how long the work will take, the extend of the problem, if possible, and the charges, if any, which may be involved. Leave the name and telephone number of the person to be contacted for pickup of the equipment and specifically state that he should be called as soon as the repairs are finished. In addition, state he should be telephoned if unexpected problems, costs and/or delays are encountered. Get the name and telephone number of the Service Manager, for any required follow-up purposes.

e. When you arrive to pick up your equipment after completion of servives, make certain that you know exactly what repairs were performed and/or parts replaced. This is required for overall problem trend evaluation by the NMP and must be identified upon completion of warranty servives.

f. Telephone the NMP at TARCOM, AUTOVON 273-3349, 273-3439 and/or 273-3387 if:

(1) Your equipment requires repairs and you cannot obtain these servives using the procedures listed above.

(2) The length of time required for repairs may seriously hamper your mission, or if the dealer's overall response to your requirements are not satisfactory.

(3) You have any questions regarding warranty procedures - either in general or about a specific job. Do not wait until your problems become critical.

g. Do not attempt to conduct negotiations regarding a breech of warranty. This is a function of the Contracting Officer, through the NMP at TARCOM.

APPENDIX C

MAINTENANCE ALLOCATION CHART

FOR

Roller, Motorized, Steel Wheel, Model C35B-D

Section I. INTRODUCTION

1. General: This Maintenance Allocation Chart designates responsibility for performance of Maintenance functions to specific Maintenance categories.

2. Maintenance functions:

a. Inspect: To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test: To verify serviceability and detect incipient failures by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service: Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust: To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align: To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate: To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install: The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace: The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair: The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul: That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DM:IR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Any. Overhaul does not normally return an item to like new condition.

k. Rebuild: Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

3. Column entries: Columns used in the Maintenance allocation chart are explained below:

a. Column I, Group Number: Column I lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly: Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions: Column 3 lists the functions to be performed on the item listed in Column 2.

d. Column 4, Maintenance Category: Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance -authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of man-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/ quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart.

e. Column 5, Tools and Equipment: Column 5 specifies by code those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks: Column 6 contains an alphabetic code which leads to the remark in Section IV, Remarks, which is pertinent to the item opposite the particular code.

APPENDIX C

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
01	ENGINE								
0100	Engine Assembly	Test		2.0					1,2,3,4
		Service	0.1						
		Replace			16.0				
		Repair			21.0				
		Overhaul				48.0			
	Engine Mounts	Replace		3.0					
0101	Cylinder Block	Test				5.0			
		Replace				40.0			
		Repair				16.0			
	Cylinder Sleeve	Replace				3.0			
	Cylinder Head	Replace			4.0				
		Repair				4.0			
		Overhaul				8.0			
0102	Crankshaft	Replace		5.0					1,2,3,4
	Main Bearings	Replace		4.0					
	Drive Pulley	Replace		2.0					
0103	Flywheel	Replace			3.0				1,2
0104	Pistons & Connecting Rods	Replace				3.0			1,2
		Repair				2.0			
	Rings & Bearings	Replace				0.5			

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
0105	Rocker Arms	Replace			0.5				
	Valve Springs	Test				0.8			
		Replace				0.3			
	Valves, Exhaust	Adjust			2.0				
		Replace				1.0			
		Repair				2.0			
	Camshaft, Bearings & Gears	Replace				4.0			
0106	Oil Cooler	Service		0.2					1,2
		Replace			1.0				
	Oil Pan	Replace			1.5				
		Repair			1.0				
	Oil Pump	Replace			0.8				
		Repair			2.0				
	Oil Pressure Regulator	Adjust			0.2				
		Replace			0.5				
	Oil Filter Assembly	Service		0.5					
		Replace			1.0				
	Oil Filter Element	Replace		0.5					
0108	Exhaust Manifold	Replace			1.0				1,2,3,4
		Repair			1.0				

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
03	FUEL SYSTEM								
0301	Fuel Injector	Test			1.0				1,2
		Replace			1.5				
0302	Fuel Pump	Replace		1.0					1,2
		Repair			1.0				
0304	Air Cleaner	Service	0.4						1
		Replace		1.0					
		Repair		0.5					
	Air Cleaner Element	Replace		0.5					
0305	Blower, Air Intake	Service		0.3					1,2
		Replace			1.0				
		Repair			2.0				
0306	Fuel Tank	Service		0.2					1,2
		Replace			1.5				
		Repair				1.0.			
	Lines & Fittings	Replace		1.0					1,2
0308	Governor, Engine Speed	Test			0.5				
		Adjust			0.5				
		Replace			1.0				
		Repair				2.0			

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
0309	Fuel Filters	Service	0.2						1
	Fuel Filter Element	Replace		0.5					
0312	Throttle Control/Linkage	Adjust			0.1				1,2
		Replace			0.4				
04	EXHAUST SYSTEM								
0401	Muffler & Exhaust Pipes	Replace		1.0					1
05	COOLING SYSTEM								
0501	Radiator	Service	0.2						1,2
		Replace		2.0					
		Repair			2.0				
0503	Thermostat	Replace		1.0					
	Hoses & Clamps	Replace		0.5					
0504	Water Pump	Replace		2.0					1,2
		Repair			1.0				
0505	Pan Assembly	Replace		1.0					1,2
		Repair			1.0				
	Fan Belts	Inspect		0.1					
		Adjust		0.5					
		Replace		1.0					
06	ELECTRICAL SYSTEM								
0601	Alternator	Test		0.1					1,2,5
		Replace		0.5					
		Repair			1.5				

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
	Alternator Drive Belt	Inspect	0.1						
		Adjust		0.2					
		Replace		0.2					
0603	Starting Motor	Test		0.2					1,2,5
		Replace		1.0					
		Repair			1.5				
0607	Instrument Panel Accessories	Replace		0.5					1,5
		Repair		0.7					
0608	Miscellaneous Electrical Items: (Switches, Circuit Breakers, etc.)	Replace		0.5					1,5
0609	Head Light Assembly	Replace		0.2					1,5
		Repair		0.4					
	Read Light Lamp Units	Replace		0.2					
0610	Sending Unites/Warning Switches.	Replace		0.2					1,5
0611	Horn Assembly	Replace		0.3					1,5
0612	Battery	Inspect	0.1						1,5
		Test		0.3					
		Service	0.2						
		Replace		0.5					
	Battery Cables	Replace		0.4					
		Repair		0.5					

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
0613	Wiring Harness	Replace		1.0					1,5
		Repair		1.0					
07	TRANSMISSION SYSTEM								
0721	Hydraulic Tank	Service	0.2						1,2
		Replace			3.0				
		Repair			3.0				
	Suction Filter	Service		0.3					
		Replace		1.0					
	Hydrostatic Pump	Replace			2.0				
		Repair			2.0				
		Overhaul				4.0			
	Servo Control Valve	Replace			1.5				
		Repair			2.0				
	Direction-Throttle Control Assy	Service		0.2					
		Adjust			1.0				
		Replace			2.0				
		Repair			2.0				
	Hydrostatic Motor	Replace			1.5				
		Repair			3.0				
		Overhaul				4.0			
	Transmission By-.Pass Valve	Replace			1.0				

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
		Repair			1.0				
	Hydraulic Oil Cooler	Service		0.3					
		Replace			1.5				
		Repair			2.0				
	Oil Return Filter	Service		0.3					
		Replace		1.0					
	Case Pressure Relief Valve	Replace			1.0				
		Repair			1.0				
	Lines & Fittings	Replace		1.0					
		Repair		1.0					
11	FI.AL DRIVE								
1100	Drive Drum Assembly	Replace			2.0				1,2,3,4
		Repair			3.0				
	Motor Carrier Assembly	Replace			1.5				
		Repair			2.5				
	Final Drive Assembly	Service		0.5					1,2,3,4
		Replace			3.0				
		Repair			3.0				
		Overhaul				8.0			
12	PARKIC BRAKE SYSTEM								
1201	Brake Lever	Adjust		0.4					

**The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
		Replace		1.0					
		Repair		1.0					
	Cable & Linkage	Replace		1.0					
		Repair		1.0					
	Brake Shoe	Replace		2.0					
		Repair			1.0				
	Brake Drum	Replace		2.0					
		Repair			1.0				
14	STEERING SYSTEM								
1401	Steering Wheel	Replace		1.0					1
1405	Guide Rolls	Replace			3.0				1,2
		Repair			1.0				
	Axle Shaft Bearings	Service		0.2					
		Replace			4.0				
		Repair			3.0				
	Yoke & Pin Assembly	Service			3.0				
		Replace			3.0				
		Repair			2.0				
1407	Steering Control Unit	Replace			2.0				1,2
		Repair			2.0				
1410	Hydraulic Pump	Replace			2.0				
		Repair			2.0				

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
		Overhaul			4.0				
1411	Hoses, Lines & Fittings	Replace		1.0					1
1412	Steering Cylinder	Service		1.0					1,2
		Replace			1.5				
		Repair			2.0				
1414	Flow Divider	Replace			1.5				1,2
		Repair			1.0				
15	FRAME								
1501	Frame Assembly	Repair			4.0				1,2
18	BODY, HOOD & COWLING								
1801	Hood & Cowling	Replace		1.0					1
		Repair		1.5					
1806	Seat Assembly	Replace		1.0					1
		Repair		1.0					
1806	Tool Box	Replace		0.5					1
		Repair		0.5					
74	EARTH MOVING EQUIPMENT COMPONENTS								
1476	Roll Scrapers	Service		0.2					1
		Replace		1.0					
		Repair		1.0					
	Roll Mat	Replace		0.5					

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

Section II. MAINTENANCE ALLOCATION CHART

ROLLER MOTORIZED, STEEL WHEEL 2 DRUM TANDEM, 10-14 TON (CCE)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE Category					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
7471	Water Spray System Tank Spray Pump & Motor	Service Replace Repair		0.5 2.0 2.0					1,2
	Water Tank Inlet Screen	Service Replace		0.3 0.3					
	Water Tank Sump Filter	Service Replace		0.3 0.3					
	Spray Manifolds & Nozzles	Service		0.5					
		Replace		0.5					
		Repair		1.0					
	Spray Pipes, Valves & Hoses	Replace		1.0					
		Repair		1.0					

*The subcolumns are as follows:

C--operator/crew F--direct support D-depot
O--organizational H--general support

MAINTENANCE ALLOCATION CHART FOR

Roller, Motorized, Steel Wheel, Model c350B-D

SECTION III - TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NATIOHAL/NATO NOMENCLATURE	TOOL STOCK NUMBER	NUMBER
		Unless otherwise noted, functions can be accomplished contained in the following	all maintenance with the tools common two sets.	
1	O, F, H	Shop Equip Contact Maint. TRK MTD (SC 4940-97-C1lE-05)	49'40-00-294-9518	T10138
1	O, F, H	Shop Equip Org Repair, Light RK MTD (SC 4940-97-CL-D4)	1/940-*.294-9516	T13152
1	O, F, H	Tool Kit Automotive Maint, Org Maint Common #1 (SC 4910-95-CL-A74)	4910-00-754-0654	W32593
1	O, F, H	Tool Kit Automotive Maint, Org Maint Common #2 (SC 4910-95-CL-A72)	4910-00-754-0650	W32730
1	O, F, H	Tool Kit, Light Weight 5180-90-CL-W26)	(SC 51t0-00-177-7033	W33004
1	O, F, H	Shop Equip Auto Maint and Repair Org Maint Supp #1 (SC 4910-95-CL-A73)	4910-00-754-0653	W32867
1	O, F, H	Shop Equip Welding Field Maint (SC 3470-95-CL-A08)	3470-00-357-7268	T16714
1	O, F, H	Tool Set, Veh Full Tracket. Sugg #2 SC 4940-95-CL-A08	49400-00-754-073	W65747
2	F, H	Shop Equip Gen Purp Repair Semitrlr MTD (SC 4940-97-C-ED 3)	4914000-287-4894	T10549
2	F, H	Tool Kit Automotive, Fuel and Elec Sys Repair (SC 4910-95-CL-A50)	5180-00-754-0655	W32456
2	F, H	Tool Kit, Master Mechanic and Equip Maint and Repair (SC 51S0-9o-CLEO5)	5180-00-699-5273	W45060

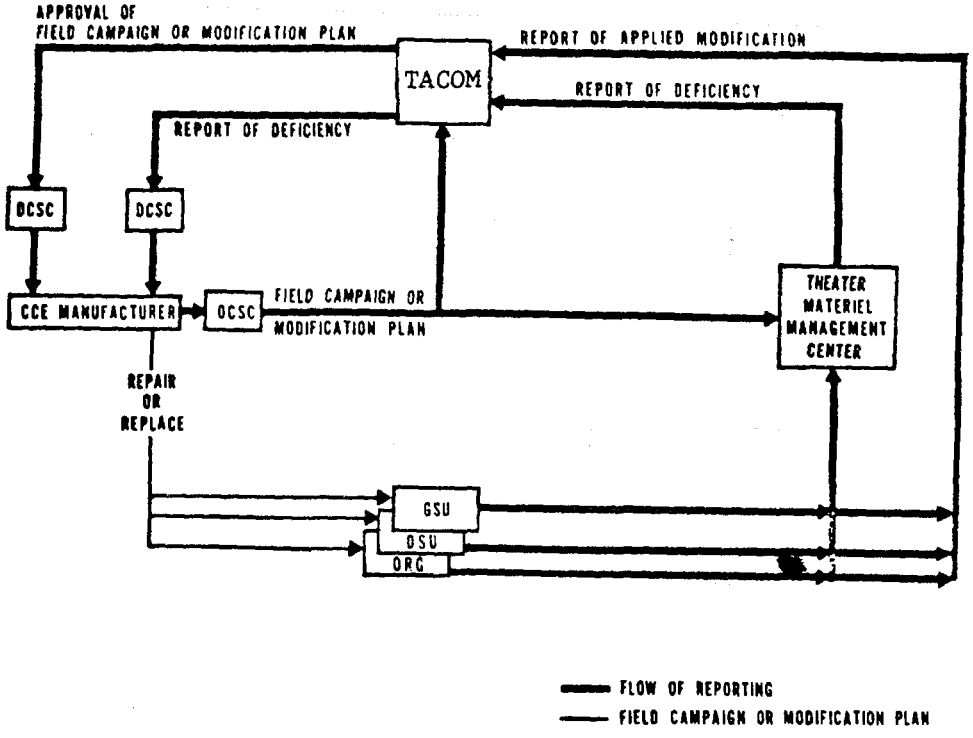
MAINTENANCE ALLOCATION CHART FOR

Roller, Motorized, Steel Wheel, Model C350B-D

SECTION III - TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
2	F, H	Shop Set, Fuel and Elec Sys Field Maint Basic (SC 4910-95-CL-AO1)	4910-00-754-0714	T30414
2	F, H	Shop Set, Fuel and Elec Sys Field Maint Basic Sup #2 (SC 4910-95-CL-A65)	4910-00-390-7775	T30688
2	F, H	Shop Equip Machine Shop, Field Maint Basic (SC 3470-95-CL-Ao2)	3470-00-754-0708	T15644
2	F, H	Measuring and Lay Out Tool Set Mach (SC 5280-95-CL-A02)	5280-00-511-1950	W44512
2	F, H	Tool Kit Body and Fender Repair	5180-00-754-0643	W33689
3	F, H	Wrench Set Socket, 3/4" Drive Hex Type	49400-754-0743	W65747
4	O, F, H	Wrench Torque, 3/4" Drive 500 lb Cap	5120-00-542-5577	Y84966
5	O, F, H	Multimeter	6625-00-999-7465	M80242

CCE MANUFACTURER FIELD CAMPAIGNS AND MODIFICATION PROCEDURES



APPENDIX E

BASIC ISSUE ITEMS LIST

NOMENCLATURE:
MANUFACTURER:
SERIAL NUMBER RANGE:

(I) MFR PART NO.	(2) MVR FED CODE	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QUANITITY FURNISHED W/EQUIP
		N-O-N-E		

ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR CODE	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION REF No & IFR CODE / USABLE ON CODE	(4) UNIT OF	(5) QTY AUTH
		NOTE: The following items are overpacked with the roller.		
	7520-00-559-9618	Case, Cotton Duck: MIL-B-11743 (81349)	EA	1
	7510-00-889-3494	Log Book Binder: MIL-B-43064	EA	1
		NOTE: The following items are authorized but not issued with the roller.		
	4210-00-889-2221	Extinguisher, Fire Dry Chemical	EA	1
	4930-00-277-9525	Grease Gun, Hand	EA	1
	4930-00-204-2550	Adapter, Grease Gun Coupling, Rigid	EA	1
	4930-00-288-1511	Adapter, Grease Gun Coupling, Flex	EA	1

APPENDIX F

INITIAL RECOMMENDATION
PRESCRIBED LOAD LIST (PLL)
AUTHORIZED STOCKAGE LIST (ASL)

END ITEM: Roller, Motorized, Steel Wheel, 2 Drum Tandem 10-14 Ton (CCE)	MAKE: HYSTER	MODEL C350B-D

MFR PART NO: N/A	NSN: 3895-00-578-0372	SERIAL NUMBER RANGE TO	DATE Feb 79

SMR CODE	NATIONAL STOCK NUMBER	PART NUMBER	FSCM		U/M	QTY OF PARTS REQ'D FOR NO. OF END ITEMS			
						PLL	ASL		
						1-5	1-5	6-20	21-50
PAOZZ	2940-00-019-8087	5574978	72582	Element, Engine Oil Filter	EA	1	1	2	4
PAOZZ	2910-00-792-8985	5774961	72582	Element, Primary Fuel Filter	EA	1	1	2	4
PAOZZ	2910-00-890-2436	5573261	72582	Element, Secondary Fuel Filter	EA	1		2	4
PAOZZ	3030-00-899-4888	154382	30076	V-Belt, Alternator	EA	1	1	2	
PAOZZ	2940-00-755-6584	180595	30076	Element, Hydraulic Oil Filter	EA	1	1	2	
PAOZZ	2940-00-368-8338	156954	30076	Element, Air Cleaner	EA	1	3	6	12
PAOZZ	3030-00-982-1212	5126447	72582	V-Belt, Matched, Fan	EA	1	1	2	
PAOZZ	2540-01-042-5750	157321	30076	Cocoa Mat	EA		1	2	

APPENDIX G

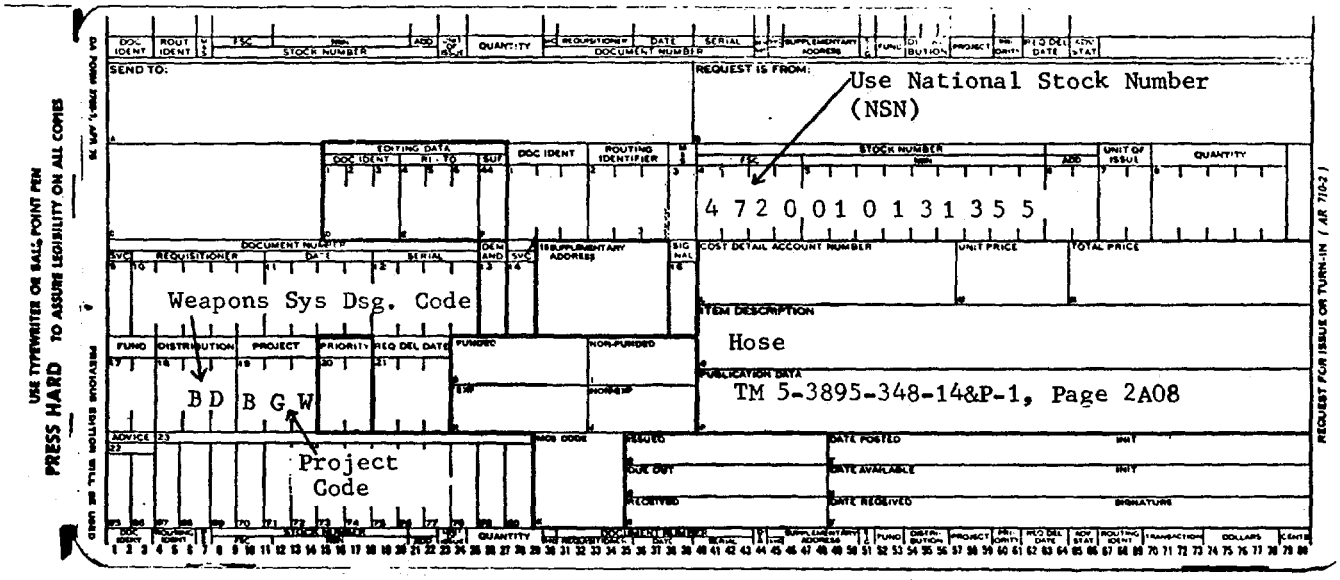
ADDITIONAL REPAIR PARTS

NSN	P/4	FSCM	Description
4120-01-013-1355	100434	30076	Hose, Radiator, Upper
472D--01-013-1354	169107	30076	Hose Radiator, Lower
2340-00-019-8087	5574978	72582	Element, Engine Oil Filter
2910-00-792-8985	5774961	72582	Element, Primary Fuel Filter
2910-00-890-2436	5573261	72582	Element, Secondary Fuel Filter
5930-00-220-6716	169776	30076	Sender, Oil Pressure
6620-00-933-3594	77328	30076	Sender, Water Temperature
5925-01-010-1084	163762	30076	Breaker, Circuit
5920-00-925-2639	53123	30076	Fuse, 5 Ampere
3030-00-899-4888	154382	30076	V-Belt, Alternator
2940-00-755-6584	180595	30076	Element, Hyd Oil Filter
4330-00-355-7750	237014	30076	Seal Element Kit, Hyd Oil Filter
5330-01-016-7837	243868	30076	Seal Kit, Steering Control
2530-00-158-1312	189585	30076	Parts Kit, Steering Control
5330-01-016-7838	223641	30076	Seal Kit, Steering Cyl
4320-00-237-3947	158913	30076	Kit - Minor, Steering Pump
6240-00-733-2984	156776	30076	Element Light, Seal Beam
6240-00-155-7859	MS15571-8	96906	Bulb, 12 Volt
5920-00-131-9915	F02832V20A	81349	Fuse, 20 Ampere
5920-00-925-2640	53124	30076	Fuse, 10 Ampere
5330-01-013-7673	169787	30076	O-Ring, Hose Flange
2940-00-368-8338	156954	30076	Element, Air Cleaner
4320-01-032-7972	190641	30076	Seal, Kit
4320-01-032-7973	267025	30076	Manifold Valve Kit, Hyd Sys
4320-01-032-7974	194393	30076	Manifold Seal Kit, Hyd Sys
3030-00-982-1212	5126447	72582	Belt-V Matched, Fan
2540-01-042-5750	157321	30076	Cocoa Mat
5330-01-043-1803	156961	30076	O-Ring, Air Cleaner
6140-00-917-2141	79792	30076	Battery, 12-Volt

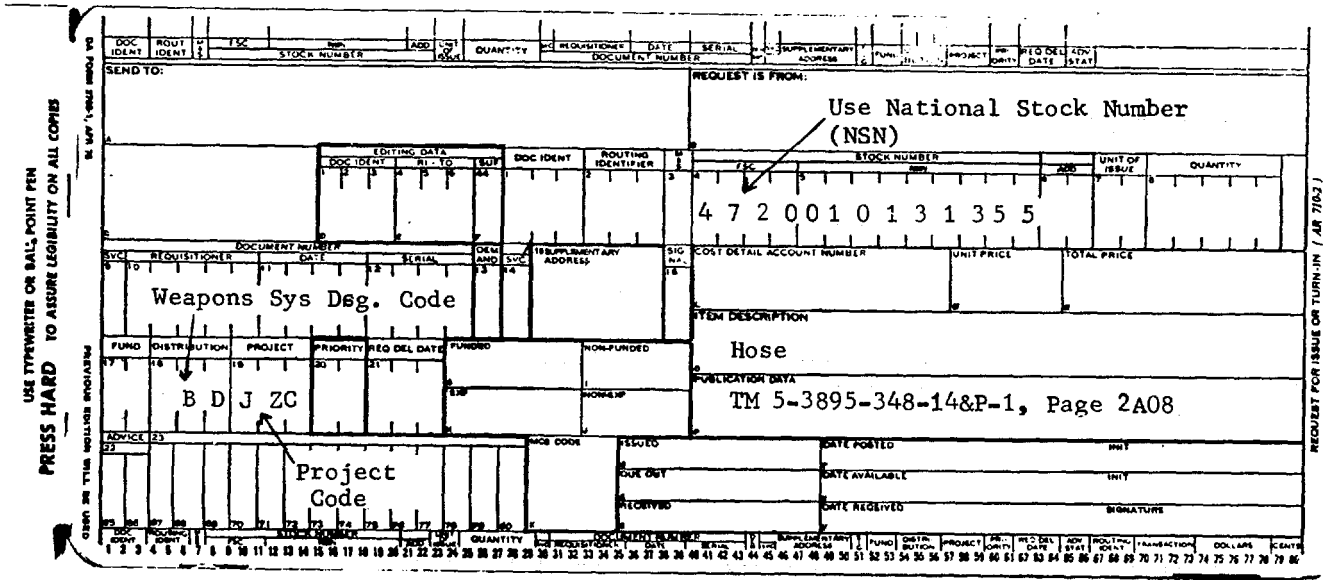
APPENDIX H

SAMPLE FORMAT - DA FORM 2765 PART NUMBER REQUEST

(CONUS Requester)

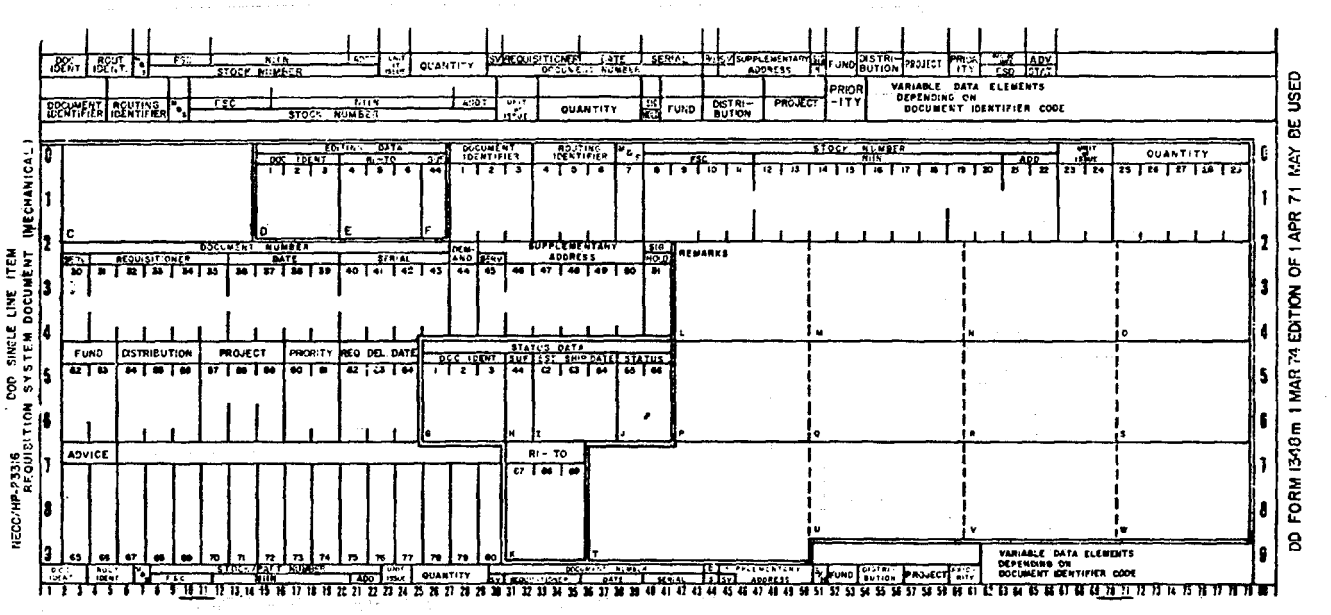


(OCONUS Requester)



APPENDIX I

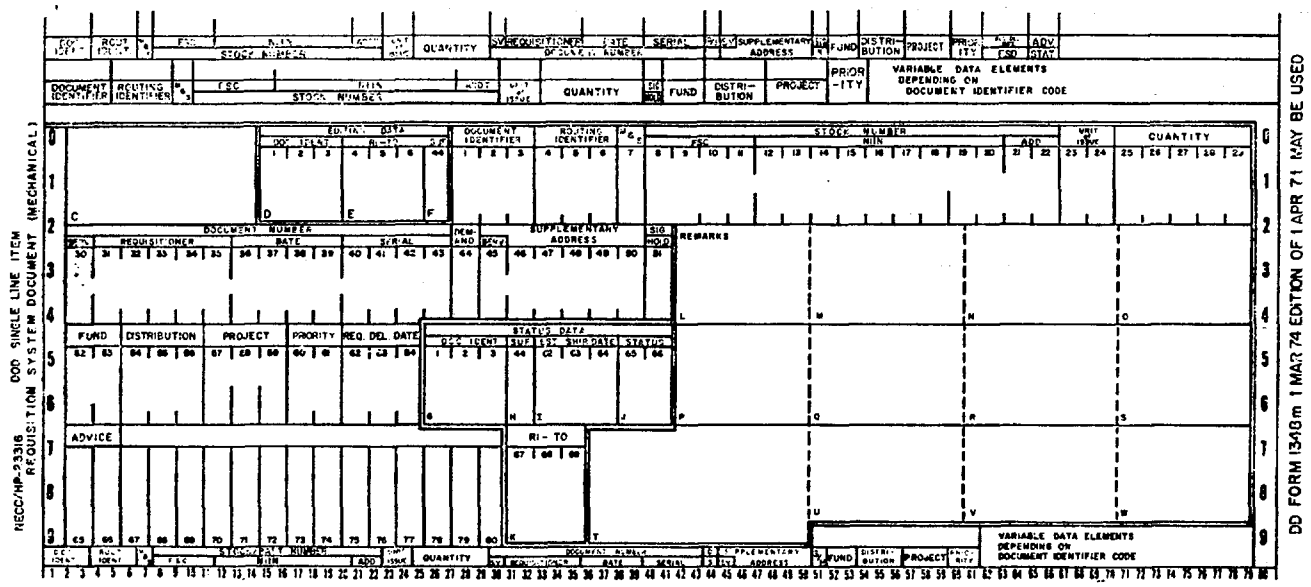
SAMPLE FORMAT-MILSTRIP REQUISTITIONS FOR (NSN)



Card Column	Description of Data	Mandatory Entry for CCE
1-3	Document Identifier Code	A0A - CONUS A011 - Overseas
4-6	Routing Identifier Code	
7	Media/Status Code	
8-22	NSN	
23-24	Unit of Issue	
25-29	Quantity	
30-43	Document Number	
44	Demand Code	
45-50	Supplementary Address	
51	Signal Code	
52-53	Fund Code	
54-56	Distribution Code CC-54	"F" for CONUS; see AR 725-50 for OCONUS
	CC-55-56	Weapon System Code
57-59	Project Code	
60-61	Priority Code	
62-64	Required Delivery Date	
65-66	Advice Code	

APPENDIX J

SAMPLE FORMAT-MILSTRIP REQUISITION FOR (NON-NSN)



Card Column	Description of Data	Mandatory Entry for CCE
1-3	Document Identifier Code	A0B - CONUS A02 - Overseas
4-6	Routing Identifier Code	Always S9C
7	Media/Status Code	
8-22	FSCM and Part Number	
23-24	Unit of Issue	
25-29	Quantity	
30-43	Document Number	
44	Demand Code	
45-50	Supplementary Address	
51	Signal Code	
52-53	Fund Code	
54-56	Distribution Code CC-54	"F" for CONUS; see AR 725-50 for OCONUS
	CC-55-56	Weapon System Code
57-59	Project Code	
60-61	Priority Code	
62-64	Required Delivery Date	
65-66	Advice Code	

CARD COLUMN	DESCRIPTION OF DATA	MANDATORY ENTRY FOR CCE
67-69	Blank	
70	Identification code applicable to entry in cc 71-80. A - Technical order or Technical Manual. B - End Item Identification C - Noun Description D- Drawing or Specification No.	
71-80	Reference Identification	Identification of reference specified in cc 70

APPENDIX K

SAMPLE FORMAT - MILSTRIP REQUISITION FOR (NON-NSN)(MANUAL)

DOCUMENT IDENTIFIER			ROUTING IDENTIFIER			M&S	MANUFACTURER'S CODE AND PART NUMBER *															UNIT OF ISSUE	QUANTITY					DOCUMENT NUMBER																	
							FSCM					PART NUMBER																SERV	REQUISITIONER						DATE						SERIAL					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43

DEMAND	SUPPLEMENTARY ADDRESS							SIGNAL	FUND CODE		DISTRIBUTION CODE			PROJECT CODE			PRIORITY		REQUIRED DELIVERY DATE			ADVICE CODE		BLANK																REJECT CODE (FOR USE BY SUPPLY SOURCE ONLY)	
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80		65	66			

IDENTIFICATION DATA

* 1. MANUFACTURER'S CODE & PART NO. *(When they exceed Card Columns 8 thru 22)*	2. MANUFACTURER'S NAME
3. MANUFACTURER'S CATALOG IDENTIFICATION AND DATE	4. TECHNICAL ORDER NUMBER
5. TECHNICAL MANUAL NUMBER	6. NAME OF ITEM REQUESTED
7. DESCRIPTION OF ITEM REQUESTED	7a. COLOR 7b. SIZE
8. END ITEM APPLICATION AND SOURCE OF SUPPLY	
8a. MAKE	8b. MODEL NUMBER / 8c. SERIES / 8d. SERIAL NUMBER
9. REQUISITIONER *(Clear Text Name and Address)*	10. REMARKS

FOLD LINE

FOLD LINE

DD FORM 1 APR 77 1348-6 EDITION OF 1 MAR 74 MAY BE USED UNTIL EXHAUSTED

NON-NSN REQUISITION *(MANUAL)*

INSTRUCTIONS

This form will only be used in those cases where the manufacturer's code and part number exceed the spaces allocated in card columns S - 22 of the requisition.

CARD COLUMN	DESCRIPTION DATA	MATUDATORY ENTRY FOR CCE
1 - 3	Document Identifier Code	A0E - CONUS A05 - OCONUS
4 - 6	Routing Identifier Code	Always S9C
7	Media Status Code	
8 - 22	FSCM and Part Number	Leave Blank Enter In Block 1 under Identification Data
23-24	Unit of Issue	
25-29	Quantity	
30-43	Document Number	
44	Demand Code	
45-50	Supplementary Address	
51	Signal Code	
52-53	Fund Code	
54-56	Distribution Code CC 54	'"F" for CONUS. (See AR 725-50 for OCONUS)
	CC 55-56	Weapon Systems Code
57-59	Project Code	
60-61	Priority Code	
62-64	Required Delivery Date	
65-66	Advice Code	
67-80		Blank

IDENTIFICATION DATA - Lower half of DD Form 1348-6, complete Blocks 1 thru 9.

APPENDIX L

MAINTENANCE AND OPERATING SUPPLY LIST

NOMENCLATURE. Roller, Motorized, Steel Wheel 2 Drum Tandem, 10-14 Ton (CCE)			MAKE HYSTER		MODEL: C350-D
MFR PART NO: N/A		NSN: 3845-00-578-0372	SERIAL NO. RANGE TO		DATE Feb 79
(1) COMPONENT APPLICATION	(2) MFR PART NO OR NAT'L STOCK NO	(3) DESCRIPTION	(4) QTY REQ QTY REQ F/INITIAL OPN	(5) QTY REQ F/8 HRS OPN	(6) NOTES
Fuel Tank	9140-00-286-5296	Diesel Fuel, DF2	25 Gal	*	55 gal drum
Engine Crank-case	9150-00-189-6727	Oil Lubricating OE/HDO 10	14 qts	*	1 qt
	9150-00-186-6668	MIL-L-2104C			5 gal.
	9150-00-186-6681	Oil Lubricating OE/HDO 30			1 qt.
	9150-00-188-9858	MIL-L-2104C			5 gal
Hydraulic Reservoir	9150-00-189-6727	Oil Lubricating O0/4DO 10	9 gal	*	1 qt
	9150-00-186-6668	MIL-L-2104C			5 gal
Final Drive	9150-01-035-5392	Oil Lubricating GO80W/90	6 qts	*	1 qt
	9150-01-035-5393	MIL-L-2105C			5 gal
	9150-01-035-5394				55 gal

MAINTENANCE AND OPERATING SUPPLY LIST

NOMENCLATURE. Roller, Motorized, Steel Wheel 2 Drum Tandem, 10-14 Ton (CCE)			MAKE HYSTER		MODEL: C350-D
MFR PART NO: N/A		NSN: 3845-00-578-0372	SERIAL NO. RANGE TO		DATE Feb 79
(1) COMPONENT APPLICATION	(2) MFR PART NO OR NAT'L STOCK NO	(3) DESCRIPTION	(4) QTY REQ QTY REQ F/INITIAL OPN	(5) QTY REQ F/8 HRS OPN	(6) NOTES
General Application Cooling System	9150-00-190-0905 6850-00-181-7933	GAA Grease MIL-G-10924 Anti-Freeze Permanent MIL-A-46153	* 16 qts	* *	 50-50 solution

APPENDIX M

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Maintenance Forms and Records

Every mission begins and ends with the paperwork. There isn't much of it, but you have to keep it up. The forms and records you fill out have several uses. They are a permanent record of the services, repairs, and modifications made on your vehicle. They are reports to organizational maintenance and to your commander. And they are a checklist for you when you want to know what is wrong with the vehicle after its last use, and whether those faults have been fixed. For the information you need on forms and records, see TM 38-750.

Preventive Maintenance Checks and Services

1. Do your before (B) PREVENTIVE MAINTENANCE just before you operate the vehicle. Pay attention to the CAUTIONS and WARNINGS.

2. During checks and services (D) of PREVENTIVE MAINTENANCE will be performed while the equipment and/or its component systems are in operation.

3. Do your after (A) PREVENTIVE MAINTENANCE right after operating the vehicle. Pay attention to the CAUTIONS and WARNINGS.

4. Do your weekly (W) PREVENTIVE MAINTENANCE weekly.

5. Do your monthly (M) PREVENTIVE MAINTENANCE once a month.

6. If something doesn't work, troubleshoot it with the instructions in this manual or notify your supervisor.

7. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

8. If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to organizational maintenance TRGHT NOW.

9. When you do your PREVENTIVE MAINTENANCE, take along the tools you need to rake all the checks. You always need a rag or two.

A-Keep it clean: Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

WARNING

Dry cleaning solvent, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 1000F - 1380F.

B - Bolts, nuts, and screws: Check them all for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it, or report it to organizational maintenance if you can't tighten it.

C - Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to organizational maintenance.

D - Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

E - Hoses and fluid lines: Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, of course. But a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to organizational maintenance.

10. It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage an operator or crew member needs to know to be able to determine the status of his/her vehicle. Learn, then be familiar with them and REMEMBER - WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Crew/Operator PMCS

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

EQUIPMENT OPERATION IS ALLOWABLE WITH MINOR LEAKAGES (CLASS I OR II). OR COURSE, CONSIDERATION MUST BE GIVEN TO THE FLUID CAPACITY IN THE ITEM/SYSTEM BEING CHECKED/INSPECTED. WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR.

Operator/Crew Preventive Maintenance Checks and Services

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired, filled, or adjusted as needed	Equipment is not ready/ available if:
						NOTE PERFORM WEEKLY AS WELL AS BEFORE PMCS'S IF: a. You are the assigned operator but have not operated the equipment since the last weekly. b. You are operating the equipment for the first time.	
1						GENERAL:	
	•					a. Visually check for loose wiring, damaged piping or hoses.	
	•	•				b. Look for evidence of fluid leakage (oil, fuel coolant).	Class 111 leaks or any fuel leakages are found.
2	•					ENGINE CRANK CASE: Check dipstick for proper level. Add oil as necessary to FULL mark.	
3	•					RADIATOR: Check coolant level. Add coolant as required. (Level should be approximately 1 inch from bottom of filler neck).	
4	•					FUEL STRAINER: Drain approximately ¼ pint to remove sediment and water.	

Operator/Crew Preventive Maintenance Checks and Services

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired, filled, or adjusted as needed	Equipment is not ready/ available if:
5	•					GUIDE ROLL AXLE BEARINGS: Lubricate daily with GAA grease. One fitting is located on each end of the guide roll shaft. Apply grease into fitting until movement of old grease around seal is observed.	
6	•					STEERING/TRANSMISSION HYDRAULIC RESERVOIR: (Cold check) Check fluid level at sight gauge. Add as required.	
7						CONTROLS AND INSTRUMENTS: (Check for proper indication and operation)	Engine coolant, engine oil pressure and transmission oil temperature gauges indicate abnormal operation.
		•				a. Ammeter Slight (+) charge.	
		•				b. Engine Coolant Temperature Gauge White (warm-up)/Green (normal)/Red (hot)	
		•				c. Engine Oil Pressure 40-60 PSI normal operation	
		•				d. Transmission Oil Temperature Gauge Green/Red	
		•				e. Hourmeter	

Operator/Crew Preventive Maintenance Checks and Services

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired, filled, or adjusted as needed	Equipment is not ready/ available if:
		•				f. Fuel Gauge:	
		•				g. Controls (i.e. steering, shifting etc.) Check for proper operation.	
8				•		TRANSMISSION SUCTION FILTER: With engine running, check reading on filter gauge.	Gauge indicates 10 or above.
9						WATER SPRAY SYSTEM/TANK:	
				•		a. Check strainer and clean with water if required.	
				•		b. Check water spray nozzle and clean if required.	
10				•		COCO MATS AND SCRAPER BAR: Check for missing or worn mats on scraper bar.	One or more missing.
						WARNING Always use extreme caution when repositioning the scraper bars as they are under considerable spring tension and may become sharp when worn.	
11						AIR CLEANER:	
				•		a. Inspect air cleaner element.	Element missing.
		•				b. Check air cleaner indicator, if red, clean and service element.	

Operator/Crew Preventive Maintenance Checks and Services

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired, filled, or adjusted as needed	Equipment is not ready/ available if:
12					•	V-BELTS: Check for frayed, cracked or broken belts.	
13					•	BATTERY: Check fluid level. Fill as necessary to split ring. Inspect for obvious defects; such as cracked case or burnt, broken or loose terminal and cables.	One or more missing or will not crank engine.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-Quarterly S-Semiannually A-Annually B-Biennially H-Hours M-Miles

ITEM NO	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and have repaired, filled, or adjusted as needed
	Q	S	A	B	H	MI	
1.	●						ENGINE: Check for leaks, loose mounts and proper operation.
2.					100		OIL FILTER: Change oil and filter.
3.					300		FUEL FILTER AND STRAINER: Change filter element and strainer element.
4.					200		V-BELTS: (all belts) Check tension.
5.							RADIATOR:
		●					a. Check for leaks and clean exterior as required.
			●				b. Check antifreeze protection.
					1000		c. Drain and flush radiator and engine.
6.							AIR CLEANER:
	●						a. Check filter element and clean as required.
					500		b. Change filter element.
7.							BLOWER SCREEN:
		●					Clean

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MI-MILES

ITEM NO	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
	Q	S	A	B	H	MI	
8.					1000		BATTERY: Check specific gravity of electrolyte in each cell.
9.			•				WATER SPRAY SYSTEM: Inspect and clean if required, the tank, strainer and nozzles.
10.			•		1000		STEERING/TRANSMISSION HYDRAULIC RESERVOIR: Drain fluid, change filters and refill. (Change both the return filter and suction filter.)
11.			•				GAGES AND CONTROLS: Check operation.
12.							FINAL DRIVE:
	•						a. Check fluid level, add as required.
					1000		b. Drain fluid, flush and refill.

APPENDIX N

HYSTER

Technical Publication Correction

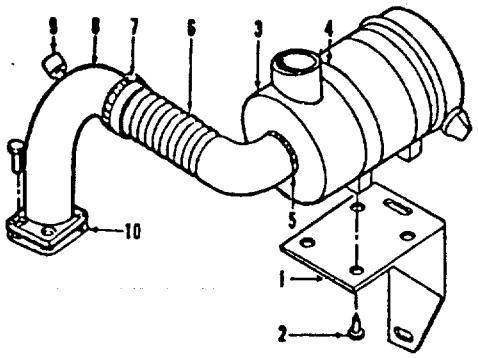
TITLE:	C350B Parts Manual
NUMBER:	599352
CONTRACT NUMBER:	DSA 700-74-C-9024

Make the following corrections to the publication listed above:

1. Cross out page 1D05 (Air Filters) as it does not apply to this roller.
2. Include attached page 1E04 in your manual.

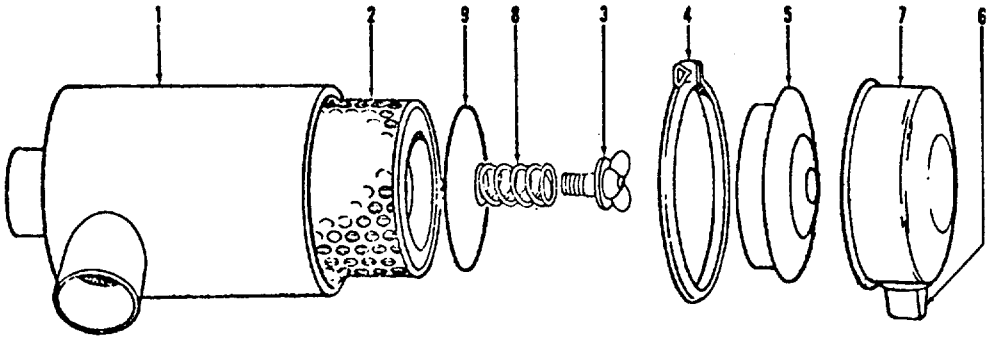
AIR FILTER

FOR 3-53 DIESEL ENGINE
FIRST USED ON SERIAL NO. B89C-3300 AND A148C-1546



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	391734	PLATE-AIR CLEANER	1
2	16598	CAPSCREW-3/8 UNC X 7/8	5
2	17428	NUT-3/8 UNC	5
3	182645	FILTER-AIR, SEE 1D08	1
4	138718	BAND-MOUNTING	2
5	78286	CLAMP	1
6	391051	HOSE	1
7	115696	CLAMP	1
8	169096	TUBE	1
9	168846	INDICATOR-RESTRICTION	1
10	170306	GASKET	1

AIR FILTER



KEY

B-FOR 3-53 DIESEL ENGINE ONLY.

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.	B
	[illegible]	[illegible]	[illegible]	..
	182645	FILTER-AIR	..	1
1	169299	BODY	..	1
[illegible]	[illegible]	[illegible]	[illegible]	..
2	156954	ELEMENT	..	1
[illegible]	[illegible]	[illegible]	[illegible]	..
3	141266	BOLT	..	1
4	262282	CLAMP	[illegible]	..
4	156958	CLAMP	..	1
[illegible]	[illegible]	[illegible]	[illegible]	..
5	156960	BAFFLE	..	1
[illegible]	[illegible]	[illegible]	[illegible]	..
[illegible]	[illegible]	[illegible]	[illegible]	..
7	189248	CUP	..	1
[illegible]	[illegible]	[illegible]	[illegible]	..
9	156961	O-RING	..	1

APPENDIX O

HESTER
TECHNICAL PUBLICATION CORRECTION

TITLE:	C350B Service Manual
NIMBER:	7109M
CONTRACT NUMBER:	DSA 700-74-C-9024

Make the following corrections to the publication listed above:

1. Section 2, Table 2-11, page 2-16 entitled BRAYR. SYSTEM SPECIFICATIONS. Torque specification on BRAKR SEART NUT reads 100 ft-lbs (13.8 g-m) and should read 26 ft-lbs (3.6 kg-m) maximum. Please note change in manual.

2. Figure 4-14, page 4-12 and figure 6-4, page 6-4 have been revised to include the horn circuit. The revised figures are attached--please include in the manual.

3. Figure 7-40, page 7-32 shows two (2) arrows pointing to control pressure port. The top (upper most) arrow is incorrect. Cross out the upper most arrow.

4. Figure 7-41, page 7-32 is incorrect. Cross out the entire figure. Case pressure must be checked by tying into the case drain line on top of the hydrostatic pump.

5. Figure 7-44, page 7-35 is incorrect. Cross out entire figure. The revised figure is attached - please include in the manual.

6. Section 7, paragraph 7-172 a, page 7-33 reads a dimension of 13/32. Please correct copy to read 1-3/32

7. Section 7, paragraph c, page 7-35 reads a dimension of 11/16. Please correct copy to read 1-1/16

8. Section 8, figure 8-42, page 8-12 is incorrect. Cross out entire figure. The revised figure is attached - please include in the manual.

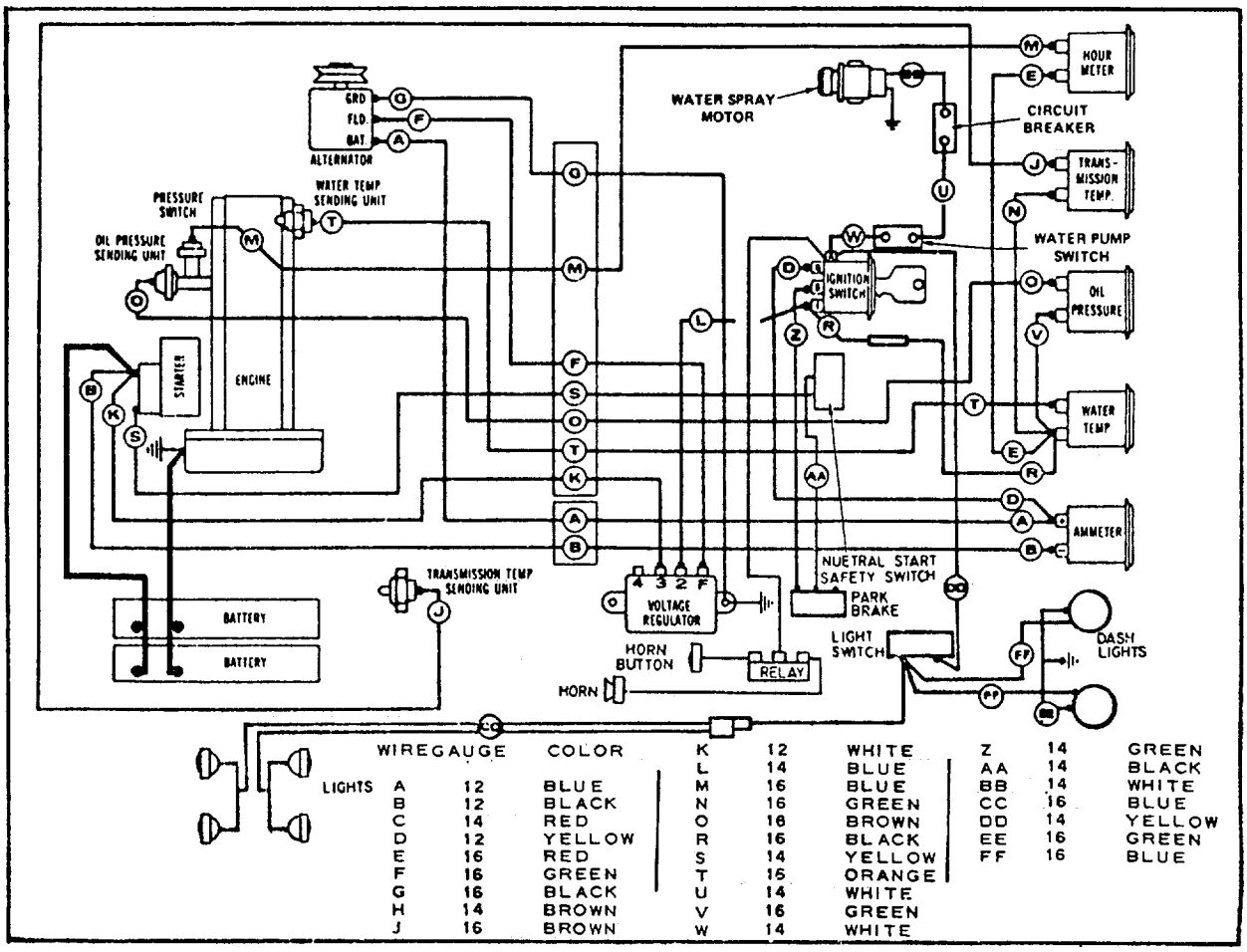


FIGURE 4-14. ELECTRICAL SYSTEM SCHEMATIC (WITH DIESEL ENGINE).

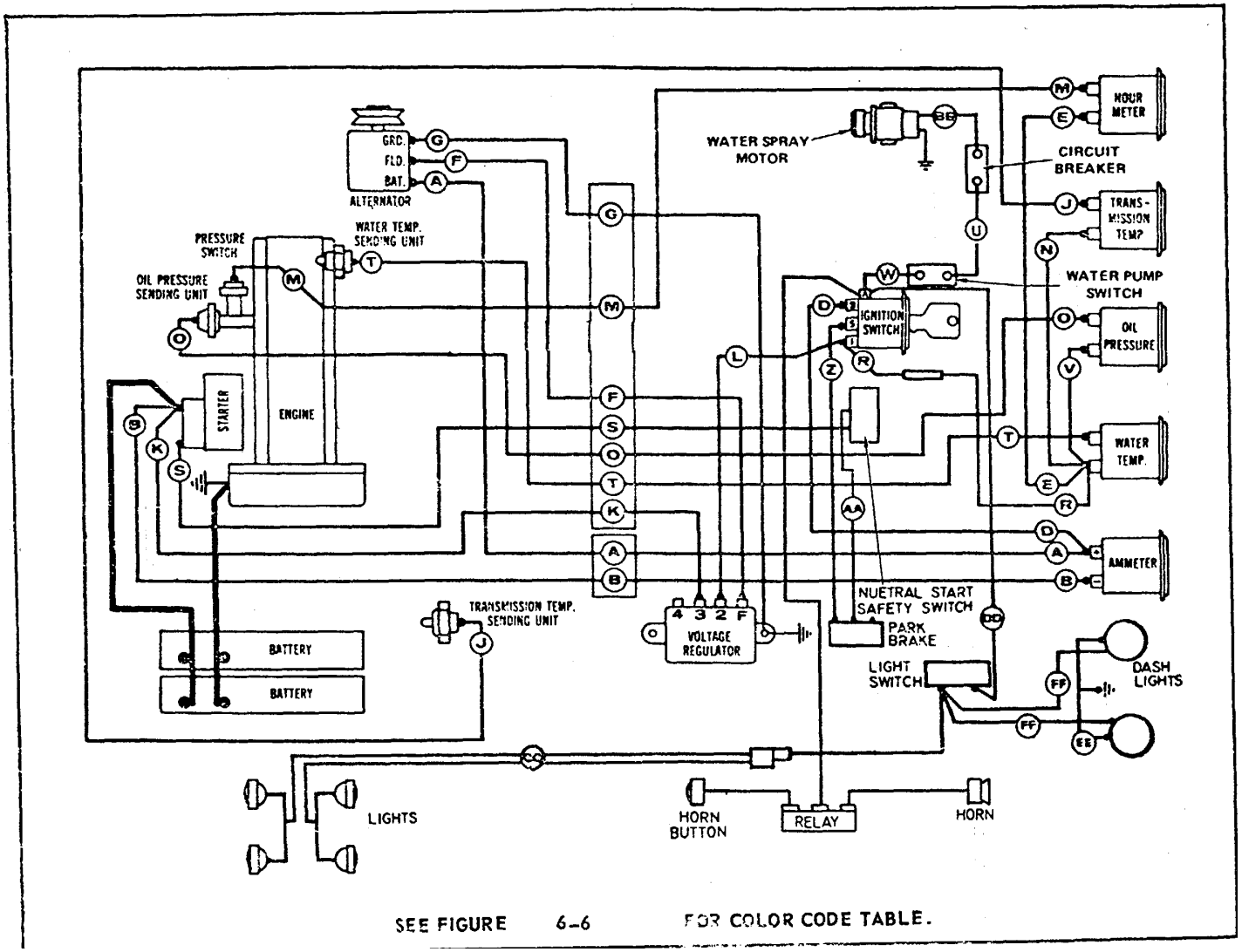


FIGURE 6-4. ELECTRICAL SCHEMATIC FOR DETROIT.

b. Adjust and tighten ball Joint of control cable at bail shaft end. Adjust neutral start safety (transmission lockout) switch so that it makes contact in neutral.

c. Move Direction-Throttle Control Bail In the forward direction until control cable at servo lever has traveled 11/16 - 31/32 in.(24.64 - 26.92 mm). Adjust bail stops so that cable cannot be moved beyond this point.

d. Repeat step c in reverse direction.

CAUTION: Ensure that the amount of bail (control cable) travel Is limited by ball stops and not the interval servo stops.

e. Return Direction-Throttle Control Ball to neutral (vertical) position.

f. Adjust and tighten wire stop at throttle crank for 1116 In. (1.59 mm) gap between swivel and wire stop (see figure 7-44).

g. Adjust ball Joint in slotted crank on bail shaft to allow full throttle when bail Is moved to either full forward or full reverse.

h. Adjust friction control nuts and spring assembly so that Direction-Throttle Control Bail will remain in any desired position.

7-173.THROTTLE CONTROL LINKAGE ADJUSTMENT PROCEDURE (see figure 7-44).

a. Adjust transmission control linkage per procedure outlined in paragraph 7-172 (Sundstrand).

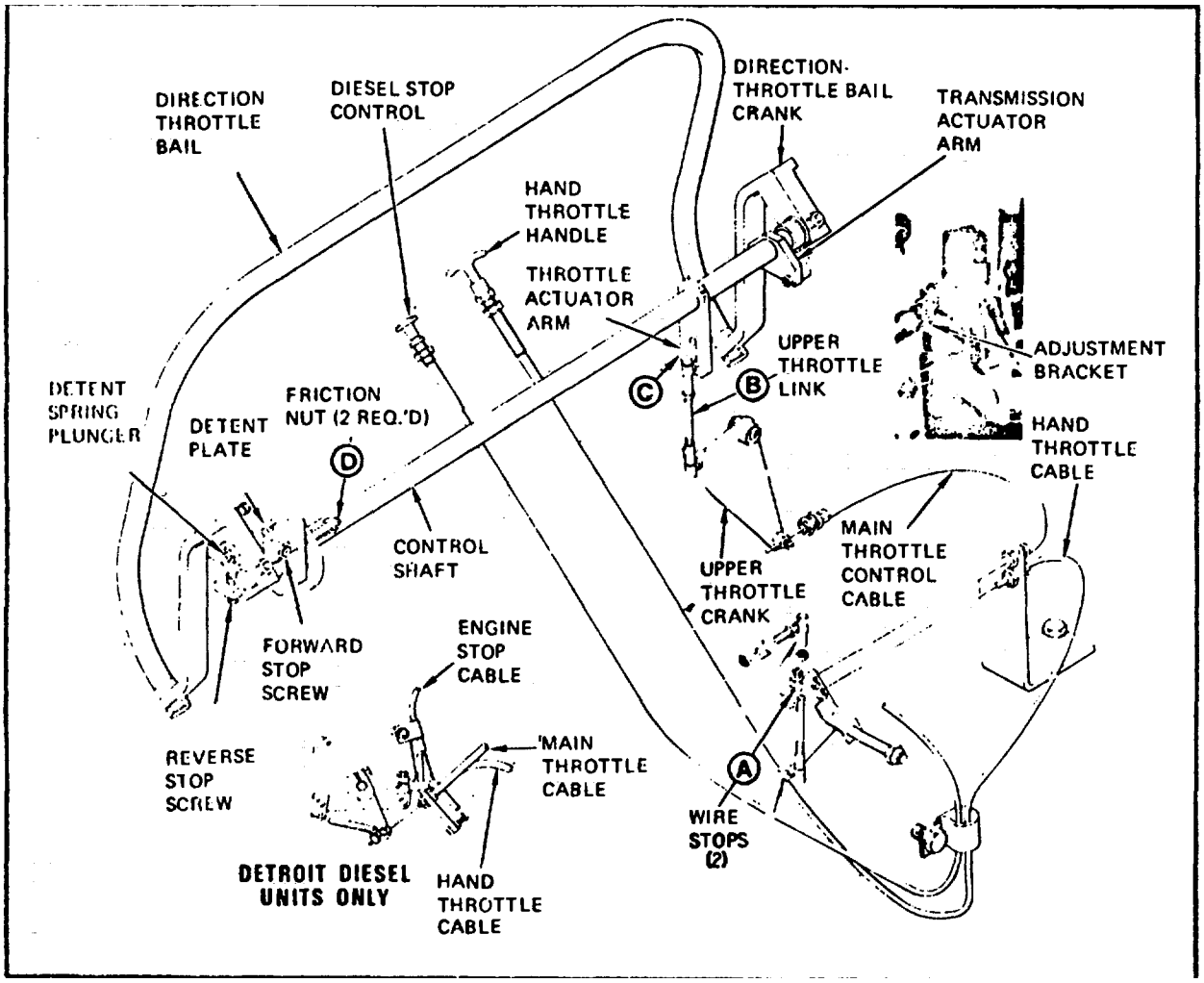


FIGURE 7-44.

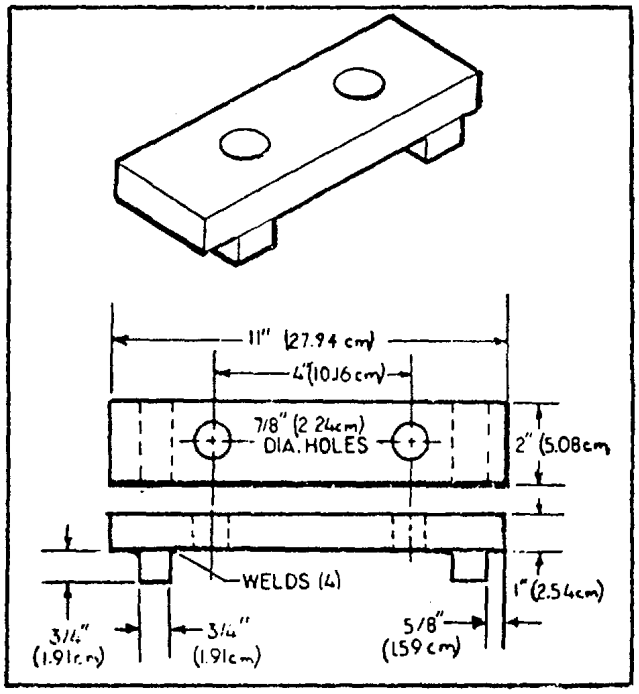
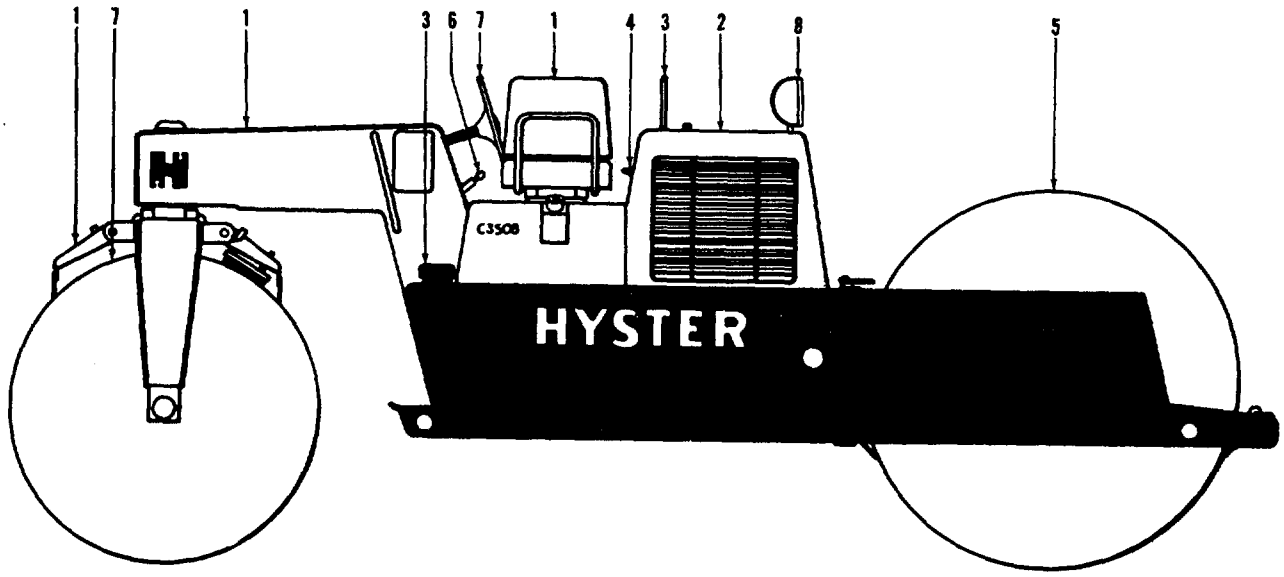

11" (27.94 cm)
4" (10.16 cm)
7/8" (2.24cm) DIA. HOLES
2" (5.08cm)
WELDS (4)
1" (2.54cm)
3/4" (1.91cm)
3/4" (1.91cm)
5/8" (1.59 cm)

FIGURE 8-42.

ILLUSTRATED INDEX



1	FRAME AND BODY PARTS, WATER SPRAY SYSTEM	1A04
2	POWER UNIT	1B02
3	FUEL SYSTEM	1D02
4	ELECTRICAL SYSTEM.....	1F02
5	TRANSMISSION AND POWER TRAIN.....	2A04
6	BRAKES AND LINKAGE.....	2C02
7	STEERING AND LINKAGE	2D02
8	OPTIONAL EQUIPMENT	2E02
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ALPHABETICAL INDEX

ALTERNATOR 1F09
BRAKE AND LINKAGE 2C03
CARBURETOR 1E04
CONTROL LINKAGE 2A09
COOLING SYSTEM 1B09

DECALS AND PAINTING INSTRUCTIONS 1A08
DISTRIBUTOR 1F04

ELECTRICAL SYSTEM-4-236 AND 3-53 DIESEL 1F05

ENGINE NOUNTS-3-53 DIESEL 1C07

EXHAUST SYSTEM-3-53 DIESEL 1C08

FINAL ORIVE-C350B 2B05
FRAME AND COWLING 1A05
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HYDRAULIC MOTOR 2A11
HYDRAULIC PUMP ..... 2A13 & 2B03
HYDRAULIC SYSTEM 2A06

LIGHTING SYSTEM 2E03

OIL FILTER 2802

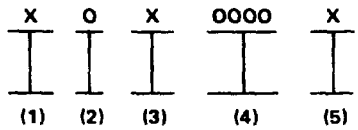
SCRAPERS AND HATS 1A06
SERVO CONTROL VALVE 2B01
STEERING CONTROL 2D04
STEERING CYLINDER 2D07
STEERING PUMP-3-53 DIESEL 2D07
STEERING SYSTEM 2D03
STEERING TRUNNION AND DRUMS 2D05

THROTTLE LINKAGE 1D07

WATER SPRAY SYSTEM 1A07

UNIT IDENTIFICATION

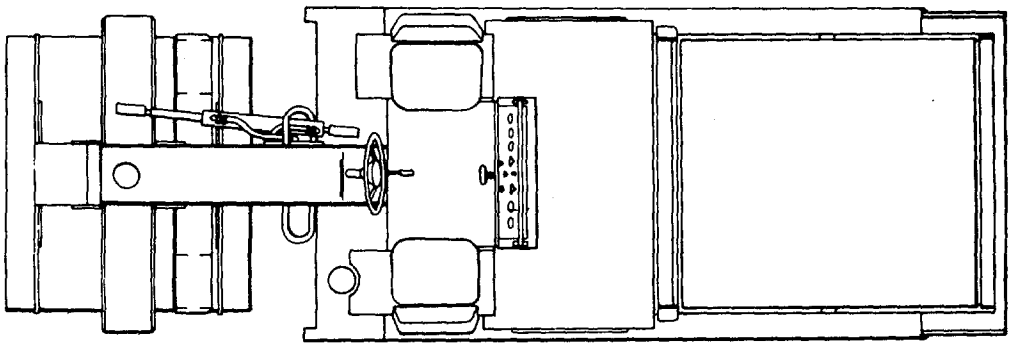
UNIT SERIAL NO.



(1) & (2) The first letter and number denote the design series and model of the unit.
(3) The second letter denotes the plant at which the unit was manufactured.
(4) The number series denotes the serial number of the unit.
(5) The final letter denotes the year of manufacture starting with "A" in 1957. The letters "I", "O", and "Q" will not be used.

Parts Referred To In This Book As Right Or Left Hand Parts Are In Accordance With The Illustration Below

R. H. Side



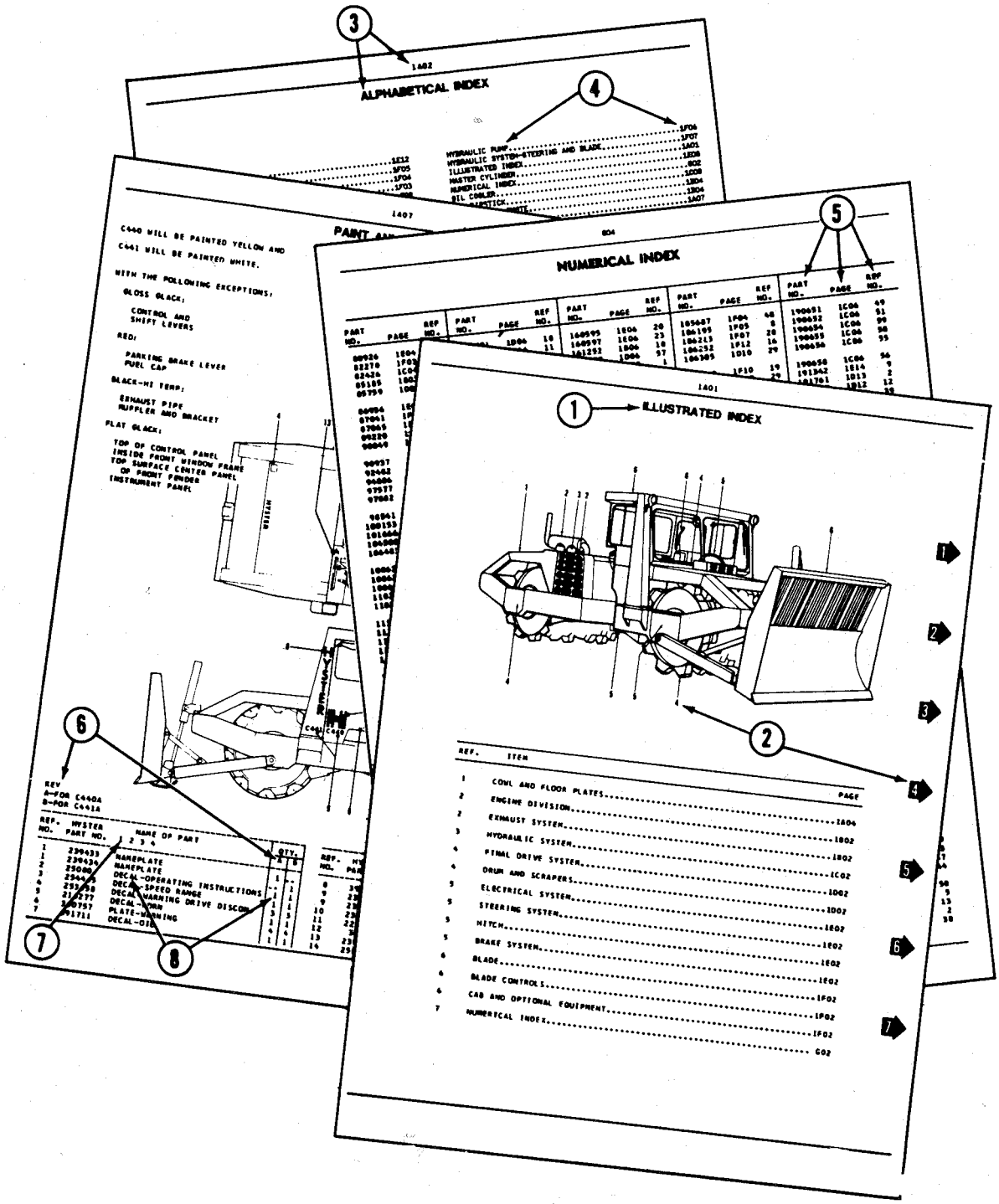
L. H. Side

CAUTION!
Never Attempt To Clean, Oil Or Adjust A Machine While It Is In Motion

HOW TO USE THE ILLUSTRATED PARTS MANUAL

This parts manual describes and illustrates assemblies subassemblies and detail parts needed for serious replacement.

It also includes all parts peculiar to units built in overseas plants. These parts are indicated by keys, symbols and footnotes.



When The Part Number And Next Higher Assembly Is Not Known:

1. **USE:** Determine the function and application of the part required. Turn to the illustrated index page immediately behind the front cover, and select the most appropriate area.

2. Line up the black arrow containing the appropriate reference number, with the black tab on the division index page with the same reference number. Use the division index to determine the assembly which would normally contain the part required. Proceed then to locate the part on the assembly breakdown page.

When The Part Number Is Not Known And Next Higher Assembly Is Known:

3. Determine the assembly the required part Is used on. Turn to the alphabetical index immediately following the Illustrated index.

4. Locate the assembly the required part is used on and turn to the page indicated for that assembly. Proceed then to locate the part on the assembly breakdown page.

When The Part Number Is Known:

5. Use the numerical Index to find the part number. Turn to the page listed and locate the part as indicated by the reference number.

GENERAL: The assembly breakdowns include part numbers, description, quantities required, keys and footnotes to help in selecting the correct parts.

6. Keys are used to show effective serial numbers, two or more similar assemblies, RH and LH assembly parts, etc. Select the appropriate key, "A", "B", "C" or "D" and the corresponding quantity column to find the required part.

7. Indent numbers are used to indicate assemblies and sub-parts of assemblies. Number 1 Is the major assembly. Part descriptions which are indented under 2, 3, or 4 are sub-parts of that major assembly shown above.

8. Quantities shown are for one assembly. Note that three assemblies are shown, but the quantities of the sub-parts are indicated as one and two This means one and two per assembly.

ORDERING PARTS: When ordering replacement parts, give the unit serial number, part number, name of part and quantity required.

For any further information on parts, service, or ordering, consult your local Hyster dealer.

FIRE PRECAUTION

To avoid fires, operators should be instructed to refuel compactors in well lighted areas outside of buildings. Repairs and adjustments should be made on only those compactors which have been taken to a garage or maintenance shop.

STORAGE OF COMPACTOR

Lubricate the compactor according to lubrication recommendations if it is to be left standing for any length of time. This will protect against rusting.

The engine should be run once a week until it is thoroughly warm. This will circulate the oil and prevent rusting from condensation, in addition to keeping the battery charged.

If freezing weather is expected before the engine will be started again, see that the cooling system is adequately protected against freezing. Drain all water ballast from drums, or use calcium chloride solution.

If the engine is to be stored or left standing longer than a normal day, fill the fuel tank with clean fuel to keep out moisture laden air. This will prevent condensation and rust from forming inside the tank.

OPERATION AND MAINTENANCE TIPS

The following tips will help increase compactor life and contribute to the reduction of expensive downtime.

1. Check lubricating and hydraulic oils and engine coolant at the beginning of each work shift. Use only recommended oils.

2. Don't work compactor until engine and hydraulic oils are warm.

3. Don't let engine idle for extended periods.

4. Don't operate compactor with faulty engine governor or with excessive hydraulic pressure. Have qualified personnel make these checks.

5. Make sure the air cleaner and oil filters are serviced correctly. All connections must be tight with no leaks in the system.

6. Do not add coolant to an overheated engine.

7. After working compactor let engine idle a few minutes before stopping.

8. Fill fuel tank at the end of the shift, when compactor is warm.

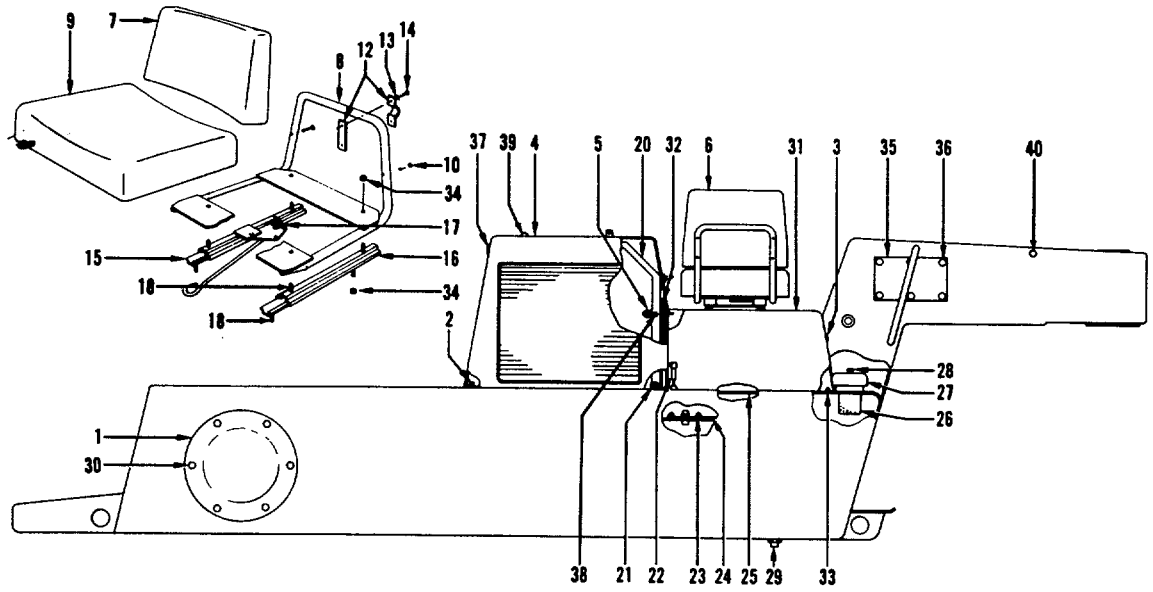
9. Repair minor defects immediately.

10. Adhere to lubrication and maintenance recommendations.

FRAME AND BODY PARTS, WATER SPRAY SYSTEM

DECALS AND PAINTING INSTRUCTIONS..... 1A08
FRAME AND COWLING 1A05
SCRAPERS AND MATS..... 1A06
WATER SPRAY SYSTEM..... 1A07

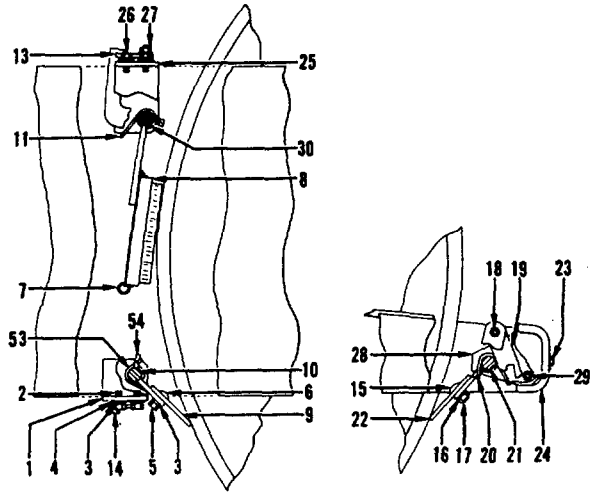
FRAME AND COWLING



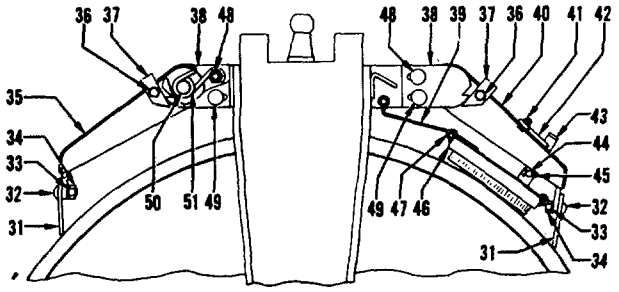
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
~~1~~	~~390722~~	~~PLATE-COVER~~	~~2~~
1	▮ 393083	PLATE-COVER, RH	1
1	▮ 390723	PLATE-COVER, LH	1
2	15056	NUT-3/8 UNC	4
2	15134	WASHER-3/8	4
2	15156	LOCKWASHER-3/8	4
3	158452	BUMPER-GROMMET TYPE	2
4	189288	COWL-GAS	1
~~4~~	~~189287~~	~~COWL-3-53 DIESEL~~	~~1~~
4	● 391373	COWL-3-53 DIESEL	1
~~4~~	~~189286~~	~~COWL-4-236 DIESEL~~	~~1~~
5	164524	EYEBOLT-5/16 UNC	1
5	95675	SPRING	1
5	18515	WASHER-5/16	2
5	145639	LOCKNUT-5/16 UNC	1
6	109983 A	SEAT	2
7	233157	CUSHION-BACK	1
7	136112	COVER	1
8	233155	FRAME	1
9	233156	CUSHION-SEAT	1
9	136111	COVER	1
10	148260	SCREW	4
12	164065	KIT-BRACKET	2
13	.....	WASHER-1/4	4
14	16709	SCREW-1/4 UNC X 3/4	4
15	204120	ADJUSTER-WITH LATCH	2
16	204121	ADJUSTER-WITHOUT LATCH	2
17	233163	SPRING-LATCH	1
18	203920	STUD	8
~~20~~	~~● 391081~~	~~PANEL-INSTRUMENT~~	~~1~~
~~20~~	~~▮ 391340~~	~~PANEL-INSTRUMENT~~	~~1~~
20	▮ 391612	PANEL-INSTRUMENT	1
20	261162	TAPE-SPONGE RUBBER, BULK	1
20	261158	TAPE-SPONGE RUBBER, BULK	1
21	15058	NUT-1/2 UNC	2
21	15158	LOCKWASHER-1/2	2
22	* 177989	LATCH	2
22	* 15687	CAPSCREW-1/4 UNC X 1 1/2	2
22	* 177991	BRACKET-ANCHOR	2
22	* 221341	LOCKNUT-1/4 UNC	2
23	156133	LOCKNUT-3/8 UNC	12
24	184814	COVER-WATER TANK	1
24	158445	GASKET	1
25	158447	PLATE-FLOOR	1
26	184819	STRAINER	1
26	184818	SNAP RING	1
27	87393	CAP-FILLER, WATER	1
28	21420	PLUG-BREATHER	1
29	15310	PLUG	1
30	16597	CAPSCREW-3/8 UNC X 3/4 G5	12
30	15156	LOCKWASHER-3/8	12
31	158439	HOOD	1
~~32~~	~~189303~~	~~GUARD-VANDALISM, GAS AND 4-236 DIESEL~~	
32			1
32	189648	GUARD-VANDALISM, 3-53 DIESEL	1
32	15055	NUT-5/16 UNC	4
32	18515	WASHER-5/16	4
32	15155	LOCKWASHER-5/16	4
32	16597	CAPSCREW-3/8 UNC X 3/4 G5	2
32	15156	LOCKWASHER-3/8	2
33	15055	NUT-5/16 UNC	4
33	18515	WASHER-5/16	4
33	15155	LOCKWASHER	4
34	15005	NUT-5/16 UNC	8
34	16775	LOCKWASHER-5/16	8
34	15175	WASHER-5/16	8
35	158449	PLATE-COVER	1
36	15056	NUT-3/8 UNC	6
36	15156	LOCKWASHER-3/8	6
37	181859	BUMPER	2
37	15002	NUT-#10 UNF	2
37	15152	LOCKWASHER-3/16	2
38	16634	CAPSCREW-3/8 UNF X 1 G5	1
38	15006	NUT-3/8 UNF	1
38	15156	LOCKWASHER-3/8	1
38	16818	CAPSCREW-5/16 UNF X 3/4 G5	1
38	15155	LOCKWASHER-5/16	1
38	18515	WASHER-5/16	1
38	15005	NUT-5/16 UNF	1
39	166296	PLUG	2
40	170686	PLUG	2

*INCLUDED IN LATCH KIT 180313.
¤LAST USED ON SERIAL NO. A146C-1535 AND B89C-3239.
#FIRST USED ON SERIAL NO. A146C-1536 AND B89C-3240. A146C-1539 USES PANEL 391081.
%FIRST USED ON SERIAL NO. A146C-1546 AND B89C-3300.
&FIRST USED ON SERIAL NO. A146C-1700 AND B89C-3401.

SCRAPERS AND MATS



FOR DRIVE DRUM

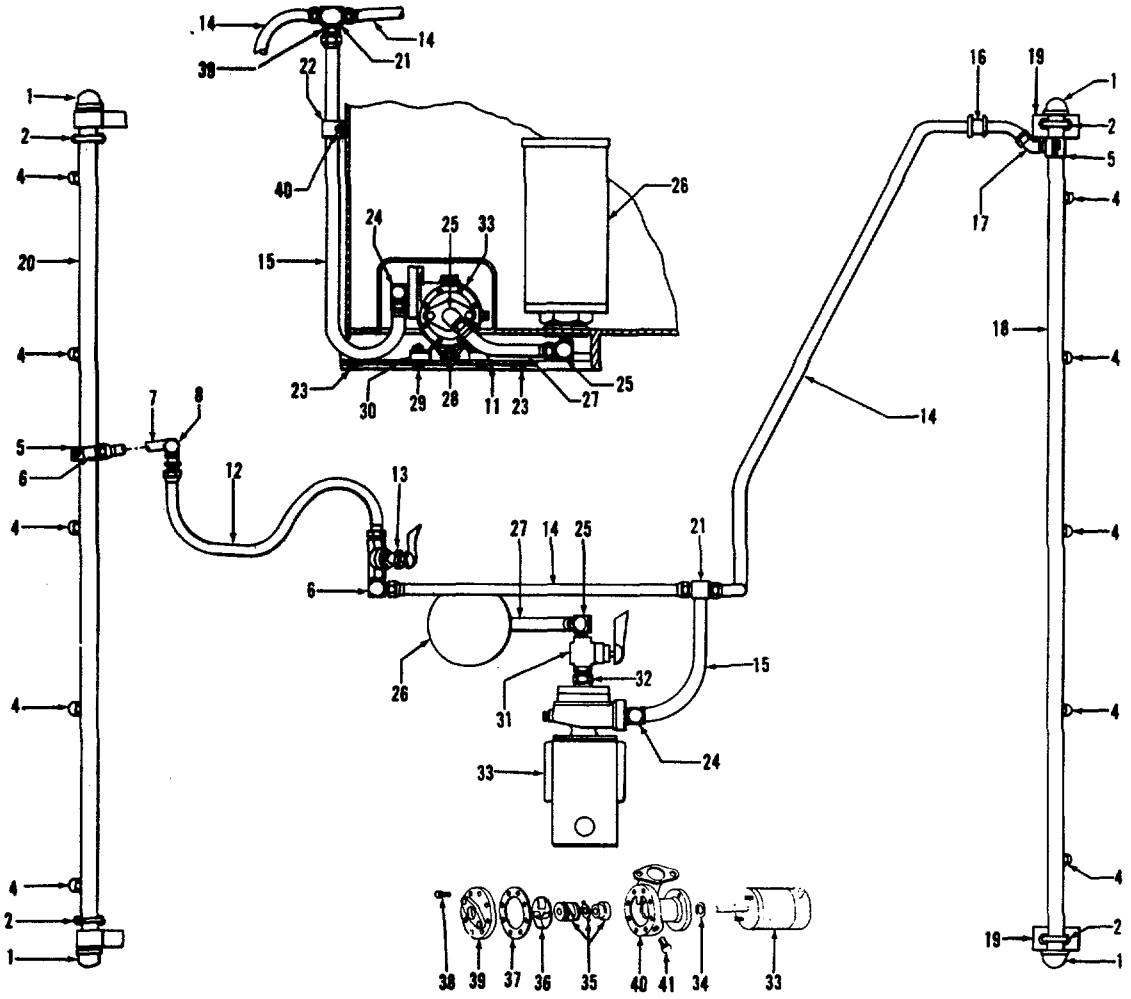


FOR STEERING DRUM

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	169694	BRACKET-LH	1
1	157325	BRACKET-RH	1
2	16830	CAPSCREW-1/2 UNC X 1 1/4 G5	4
3	15158	LOCKWASHER-1/2	6
4	15135	WASHER-1/2	8
5	15058	NUT-1/2 UNC	2
6	18588	BOLT-1/3 UNC X 1-1/4	2
7	89469	COTTER	16
8	157321	MAT	1
~~8~~	~~* 390683~~	~~MAT~~	~~1~~
9	157315	PLATE-SCRAPER	1
~~9~~	~~* 390682~~	~~PLATE-SCRAPER~~	~~1~~
10	169695	SHAFT	1
11	169698	SPRING-RH	1
13	157314	HOOK	2
14	16691	CAPSCREW-5/16 UNF X 7/8 G5	1
14	18515	WASHER-5/16	2
14	15025	NUT-5/16 UNF	1
15	18588	BOLT-1/2 UNC X 1-1/4	2
16	15158	LOCKWASHER-1/2	2
17	15058	NUT-1/2 UNC	2
18	16634	CAPSCREW-3/8 UNF X 1 G5	1
18	15006	NUT-3/8 UNF	1
19	157343	PLATE-LOCKING	1
20	169697	SPRING-RH	1
20	169698	SPRING-LH	1
21	169699	SHAFT	1
22	157315	PLATE-SCRAPPER	1
~~22~~	~~* 390682~~	~~PLATE-SCRAPER~~	~~1~~
23	16085	CAPSCREW-1/2 UNC X 1 3/4 G5	4
23	15158	LOCKWASHER-1/2	4
23	15058	NUT-1/2 UNC	4
24	157335	BUMPER	1
25	184335	BRACKET-LH	1
25	184337	BRACKET-RH	1
26	16830	CAPSCREW-1/2 UNC X 1 1/4 G5	4
26	15135	WASHER-1/2	4
26	15158	LOCKWASHER-1/2	4
27	16825	CAPSCREW-5/16 UNF X 1 G5	1
27	18515	WASHER-5/16	2
27	15005	NUT-5/16 UNF	1
28	157342	PLATE	1
29	16830	CAPSCREW-1/2 UNC X 1 1/4 G5	2
29	15158	LOCKWASHER-1/2	2
29	15058	NUT-1/2 UNC	2
30	170551	BRACKET-MAT	1
~~30~~	~~* 390695~~	~~BRACKET-MAT~~	~~1~~
31	157315	PLATE-SCRAPPER	2
~~31~~	~~* 390682~~	~~PLATE-SCRAPER~~	~~2~~
32	18588	BOLT-1/2 UNC X 1-1/4	4
33	15158	LOCKWASHER-1/2	4
34	15058	NUT-1/2 UNC	4
35	157305	BRACKET-SCRAPER	1
36	18202	CAPSCREW-SPECIAL	2
36	15026	NUT-3/8 UNF	2
37	157322	PAWL-RATCHET	2
38	157302	BRACKET-LH	2
~~38~~	~~* 390681~~	~~BRACKET-LH~~	~~2~~
38	157303	BRACKET-RH	2
~~38~~	~~* 390686~~	~~BRACKET-RH~~	~~2~~
39	184331	BRACKET-MAT	1
40	157309	BRACKET-SCRAPER	1
41	18497	CAPSCREW-5/16 UNC X 3/4	1
41	18515	WASHER-5/16	1
41	15114	NUT-5/16 UNC	1
42	157314	HOOK	1
43	157318	PLATE	1
44	142	PIN-ROD END	1
45	15212	COTTER-3/32 X 3/4	1
46	157321	MAT	1
~~46~~	~~* 390685~~	~~MAT~~	~~1~~
47	89469	COTTER	16
48	18590	CAPSCREW-1/2 UNC X 2 1/2 G5	2
48	15158	LOCKWASHER-1/2	2
48	15058	NUT-1/2 UNC	2
48	67326	SPACER	2
49	18588	BOLT-1/2 UNC X 1-1/2	6
49	15158	LOCKWASHER-1/2	6
49	15058	NUT-1/2 UNC	6
50	157313	SHAFT	2
50	58933	SNAP RING	2
51	157312	SPRING	2
53	169698	SPRING-RH	1
53	169697	SPRING-LH	1
54	19936	ROLL PIN-5/16 X 3 3/4	1

~~* USED ON G240A ONLY~~

WATER SPRAY SYSTEM

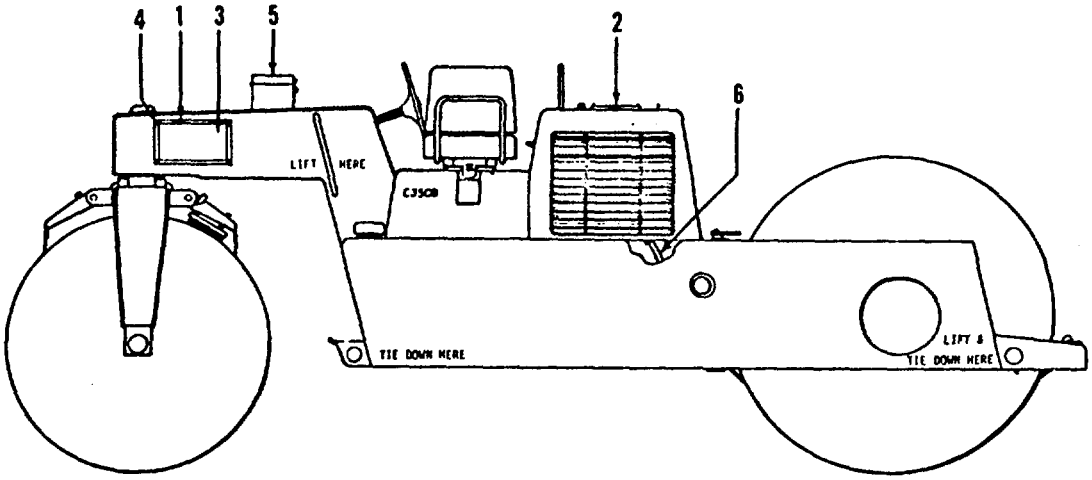


REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	15373	CAP-PIPE	2
2	184313	U-BOLT	4
2	15154	LOCKWASHER-1/4	8
4	199400	NOZZLE-SPRAY	10
5	184317	CONNECTOR	2
6	69240	ELBOW	1
6	14546	ELBOW	1
7	116486	HOSE	1
8	16457	ELBOW	1
11	184321	PLATE	1
12	169708	HOSE	1
13	169693	VALVE	1
14	153685	HOSE	2
15	184320	TUBE	1
16	115983	GROMMET	1
17	14546	ELBOW	1
18	390016	PIPE-MANIFOLD	1
19	184327	PLATE	2
20	199398	PIPE-MANIFOLD	1
~~00~~	~~000000~~	~~PIPE-MANIFOLD~~	~~1~~
21	14652	TEE	1
22	136516	CLAMP-HOSE	1
23	18535	CAPSCREW-3/8 UNC X 5/8 G5	4
23	15156	LOCKWASHER-3/8	4
24	17306	ELBOW	1
25	17309	ELBOW	2
26	199401	FILTER-SUMP	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
27	192335	HOSE	1
28	15329	PLUG-DRAIN	1
29	18466	CAPSCREW-1/4 UNC X 1 1/4 G5	4
29	15054	NUT-1/4 UNC	4
29	15154	LOCKWASHER-1/4	4
30	184322	BLOCK-SUPPORT	2
31	184324	VALVE	1
32	16116	BUSHING	1
33	184325	PUMP AND MOTOR	1
33	196281	MOTOR	1
33	197861	CAP-BRUSH	2
33	197862	BRUSH AND SPRING	2
34	196431	SLINGER	1
35	196284	SEAL	1
36	196283	IMPELLER	1
37	196286	GASKET	1
38	196285	SCREW AND WASHER	8
39	249292	COVER	1
40	249291	BODY-PUMP	1
41	15329	PLUG-DRAIN	1
42	14678	CONNECTOR	1
43	15056	NUT-3/8 UNC	1
43	15156	LOCKWASHER-3/8	1

~~*USED ON 69500~~
~~*USED ON 69494~~

DECALS AND PAINTING INSTRUCTIONS



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	393321	PLATE-COVER	1
2	393320	PLATE-COVER	1
2	393317	DECAL-NOISE	1
3	393316	DECAL	1
4	222031	RIVET	8
5	393562	TOOL BOX	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
5	15155	WASHER-5/16	4
5	10515	WASHER-5/16	4
5	16836	CAPSCREW-5/16 UNC X 3/4	4
6	168718	CLAMP	1
6	193772	HOSE-CRANKCASE VENT	1
	393563	PAINT-MILITARY GREEN	AR

DETROIT DIESEL ENGINE-SERIES 3-53

NOTE-FOR SERVICE OF THIS ENGINE, SEE YOUR DETROITDIESEL MANUAL AND CONTACT YOUR LOCAL DETROIT DEALER.

POWER UNIT

CAMSHAFT-GAS 1803

CAMSHAFT-4-236-DSL 1C03

COOLING SYSTEM 1B09

CRANKSHAFT-GAS 1B02

CRANKSHAFT-4-236-DSL 1C02

CYLINDER-BLOCK-GAS 1B03

CYLINDER-BLOCK-4-236-DSL 1B12

CYLINDER-HEAD-GAS 1B05

CYLINDER-HEAD-4-236-DSL 1B13

CYLINDER-HEAD-COVER-GAS 1B05

CYLINDER-HEAD-COVER-4-236-DSL 1C01

ENGINE-MOUNTS-GAS 1B07

ENGINE-MOUNTS-4-236-DSL 1B11

ENGINE MOUNTS-3-53 DSL 1C07

EXHAUST-SYSTEM-GAS 1B08

EXHAUST-SYSTEM-4-236-DSL 1C04

EXHAUST SYSTEM-3-53 DSL 1C08

MANIFOLDS-GAS 1B05

MANIFOLDS-4-236-DSL 1B15-1B14

OIL-FILTER-GAS 1B05

OIL-FILTER-4-236-DSL 1C05

OIL-PUMP-GAS 1B08

OIL-PUMP-4-236-DSL 1C04

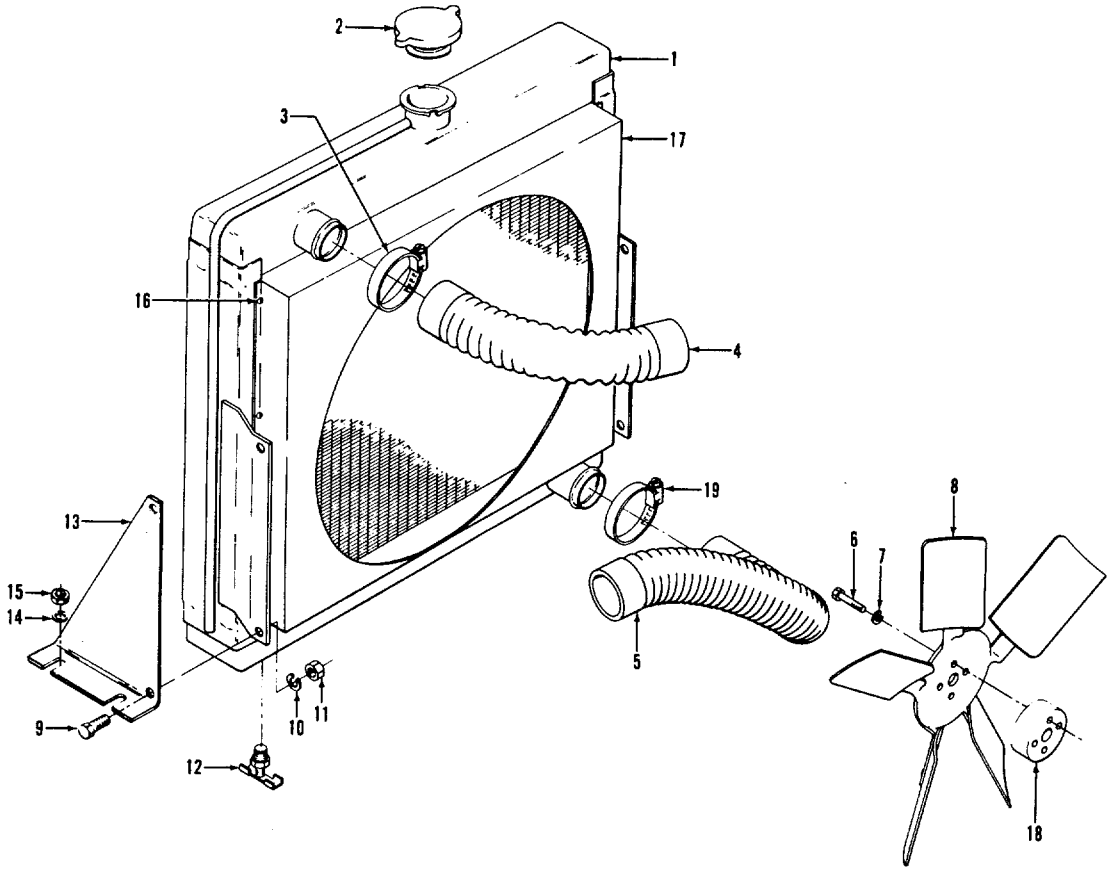
TIMING-GEAR-GAS 1B03

TIMING-GEAR-4-236-DSL 1C03

WATER-PUMP-GAS 1B09

WATER-PUMP-4-236-DSL 1B10

COOLING SYSTEM



KEY

~~A-FOR GAS ENGINE.~~

~~B-FOR 4-236 DIESEL ENGINE.~~

C-FOR 3-53 DIESEL ENGINE.

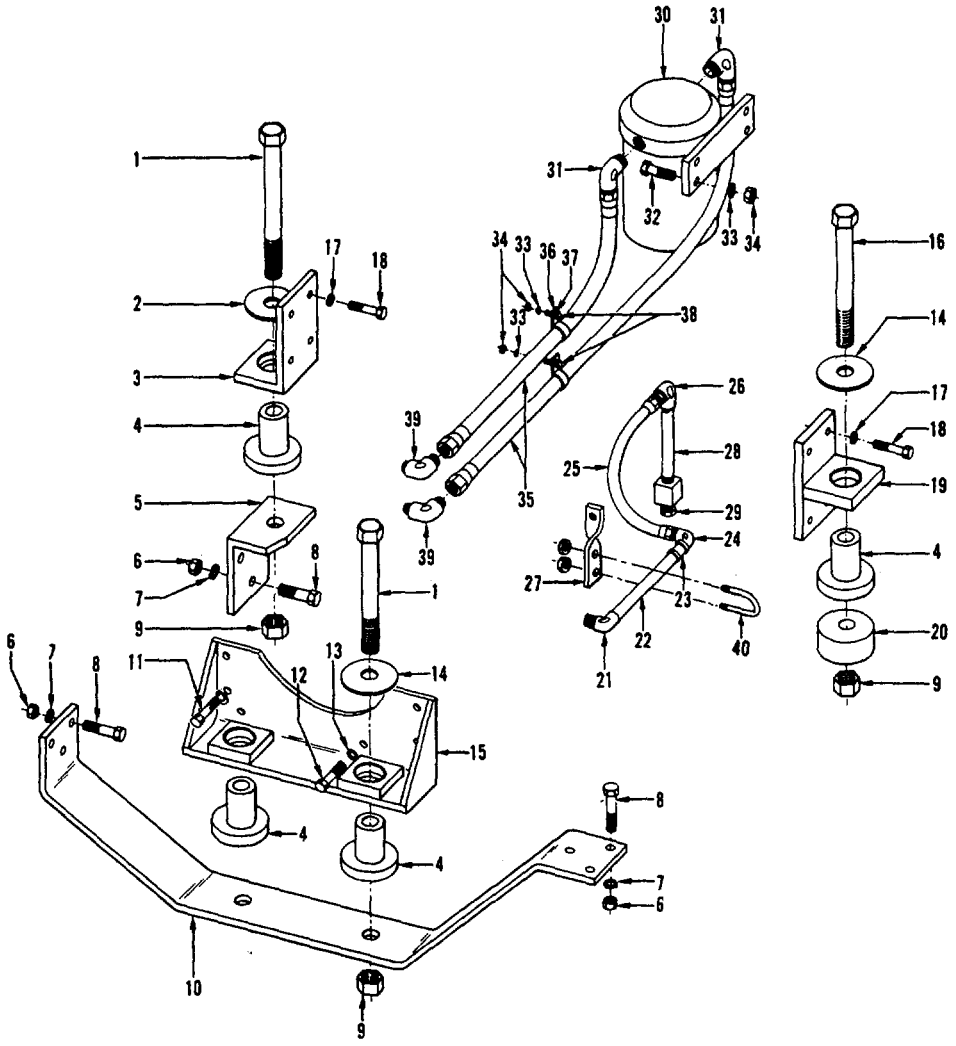
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. C
~~1~~	~~160445~~	~~RADIATOR~~	~~--~~
~~1~~	~~165282~~	~~RADIATOR~~	~~--~~
1	169105	RADIATOR	1
2	106483	CAP-RADIATOR	1
3	119236	CLAMP	2
~~4~~	~~390325~~	~~HOSE-COOLANT~~	~~--~~
~~4~~	~~390325~~	~~HOSE-COOLANT~~	~~--~~
4	100434	HOSE-RADIATOR	1
~~5~~	~~155467~~	~~HOSE-RADIATOR~~	~~--~~
~~5~~	~~110667~~	~~HOSE-RADIATOR~~	~~--~~
5	169107	HOSE-RADIATOR	1
~~5~~	~~164134~~	~~TUBE~~	~~--~~
~~5~~	~~146644~~	~~HOSE-RADIATOR~~	~~--~~
~~6~~	~~18511~~	~~CAPSCREW-5/16 UNF X 2-G5~~	~~--~~
~~6~~	~~16663~~	~~CAPSCR.-5/16 UNF X 5/8-G5~~	~~--~~
~~6~~ *	~~10499~~	~~CAPSCREW~~	~~--~~
~~7~~	~~15155~~	~~LOCKWASHER-5/16~~	~~--~~
~~8~~	~~147369~~	~~FAN~~	~~--~~
~~8~~	~~106155~~	~~FAN~~	~~--~~
9	16805	CAPSCREW-3/8 UNC X 1	2
9	17262	CAPSCREW-7/16 UNC X 5/8	2
10	15156	LOCKWASHER-3/8	4

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. C
11	15057	NUT-7/16 UNC	2
12	12815	COCK-DRAIN	1
~~13~~	~~157364~~	~~BRACKET-RADIATOR~~	~~--~~
13	190519	BRACKET-RADIATOR	1
14	15134	WASHER-3/8	2
15	145641	NUT-3/8 UNC	2
~~16~~	~~134102~~	~~SCREW~~	~~--~~
16	16719	SCREW-#8 UNC X 3/8	6
16	15163	LOCKWASHER-#8	6
~~17~~	~~161145~~	~~SHROUD~~	~~--~~
~~17~~	~~190520~~	~~SHROUD~~	~~--~~
~~17~~	~~191104~~	~~SHROUD~~	~~--~~
17	391369	SHROUD	1
~~18~~	~~169027~~	~~SPACER~~	~~--~~
~~18~~	~~161527~~	~~SPACER~~	~~--~~
19	112989	CLAMP-HOSE	2
~~19~~	~~119236~~	~~CLAMP-HOSE~~	~~--~~

~~*FIRST USED ON SERIAL NO. A140C-1546 AND B096-3300.~~

~~#FIRST USED ON SERIAL NO. B096-3202.~~

ENGINE MOUNTS, CRANKCASE DRAIN, AND FILTER HOSES
FOR 3-53 DIESEL ENGINE



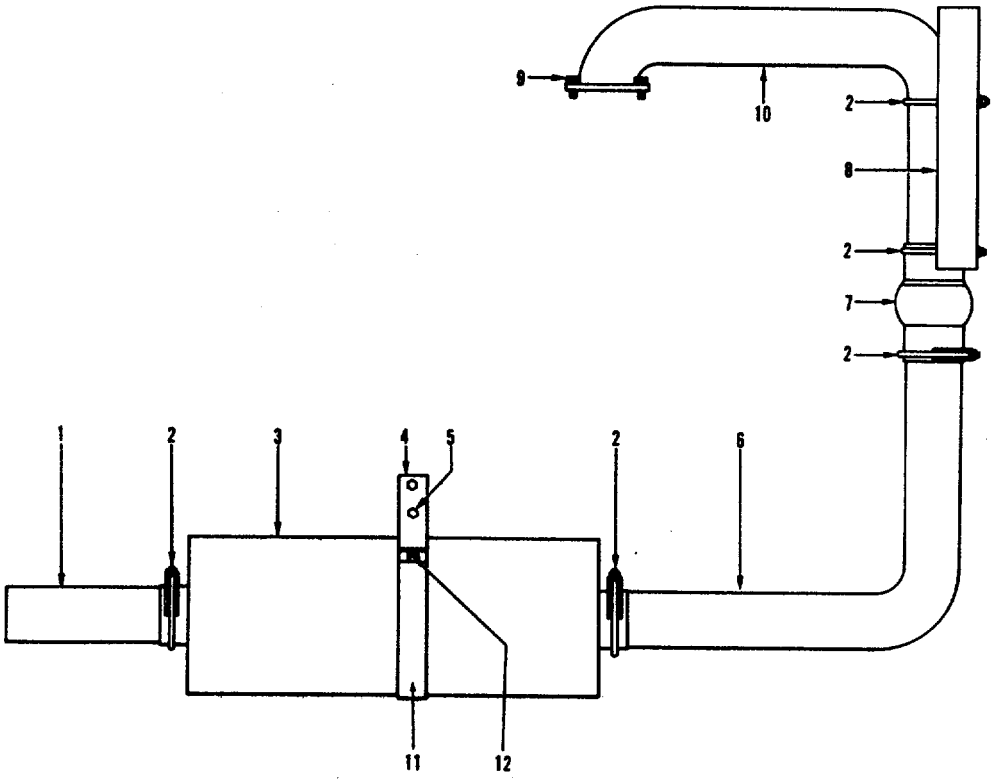
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	12948	CAPSCREW-5/8 UNF X 3 G5	3
2	21162	WASHER-5/8	1
3	168836	BRACKET	1
4	164280	MOUNT-ENGINE	4
5	168835	ANGLE	1
6	15012	NUT-3/4 UNF	9
7	15162	LOCKWASHER-3/4	9
8	16800	CAPSCREW-3/4 UNF X 2 G5	9
9	17405	LOCKNUT-5/8 UNF	4
10	168830	BRACKET	1
11	18543	CAPSCREW-3/8 UNF X 3 3/4 G5	4
11	15156	LOCKWASHER-3/8	4
12	18557	CAPSCREW-7/16 UNC X 1 1/4 G5	2
13	15157	LOCKWASHER-7/16	2
14	164281	WASHER-5/8	3
15	205127	BRACKET	1
16	12481	CAPSCREW-5/8 UNF X 4 1/2 G5	1
17	15158	LOCKWASHER-1/2	8
18	16830	CAPSCREW-1/2 UNC X 1 1/4 G5	8
19	168838	BRACKET	1
20	168841	SPACER	1
21	17311	ELBOW	1
22	19689	NIPPLE	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
23	15461	COUPLING	1
24	17300	ELBOW	1
25	99443	HOSE-HYDRAULIC	1
26	14526	ELBOW	1
27	191782	BRACKET	1
28	198881	PIPE	1
29	14386	PLUG-3/8	1
30	.....	OIL FILTER-COMES WITH ENGINE	1
~~31~~	~~17301~~	~~ELBOW~~	~~2~~
31	16275	PLUG	2
32	16828	CAPSCREW-3/8 UNC X 1 1/4 G5	4
33	15156	LOCKWASHER-3/8	6
34	15056	NUT-3/8 UNC	6
35	76787	HOSE-HYDRAULIC	2
36	113687	CLAMP	2
37	15176	WASHER-3/8	2
38	16805	CAPSCREW-3/8 UNC X 1 G5	2
39	17307	ELBOW	2
40	184313	U-BOLT	1

~~LAST USED ON SERIAL NUMBER B80C-3033~~
~~FIRST USED ON SERIAL NUMBER B80C-3033~~

EXHAUST SYSTEM

FOR 3-53 DIESEL ENGINE



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	169116	TAILPIPE	1
2	30375	CLAMP	6
3	153025	MUFFLER	1
4	192208	STRIP	1
5	16828	CAPSCREW-3/8 UNC X 1 1/4 G5	2
5	15156	LOCKWASHER-3/8	2
5	15056	NUT-3/8 UNC	2
6	169112	PIPE	1
7	169115	SWIVEL-EXHAUST	1

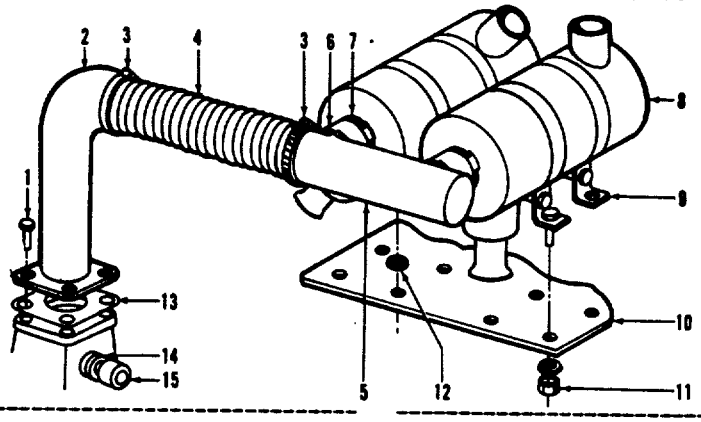
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
8	169114	SHIELD-HEAT	1
9	16805	CAPSCREW-3/8 UNC X 1 G5	4
9	15156	LOCKWASHER-3/8	4
9	15176	WASHER-3/8	4
10	169109	PIPE-EXHAUST	1
11	192205	STRIP-FORMED	2
12	15529	CAPSCREW-3/8 UNC X 1	2
12	15156	LOCKWASHER-3/8	2
12	15056	NUT-3/8 UNC	2

FUEL SYSTEM

AIR FILTER-GAS	1D04
AIR FILTER-4-236 DSL	1D04
AIR FILTER-3-53 DSL	1E04
CARBURETOR	1E04
FUEL INJECTION PUMP-4-236 DSL	1D13
FUEL INJECTION SYSTEM-4-236 DSL	1D12
FUEL OIL LIFT PUMP-4-236 DSL	1E01
FUEL PUMP-GAS	1D03
FUEL SYSTEM-GAS	1D03
FUEL SYSTEM-4-236 DSL	1D11
FUELS SYSTEM-3-53 DSL	1E03
GOVERNOR	1D03
SECONDARY FUEL FILTER040236 DSL	1E01
SECONDARY FUEL FILTER-3-53 DSL	1E03
THROTTLE LINKAGE	1D07

AIR FILTER

~~FOR 3-99 DIESEL ENGINE~~
~~LAST USED ON SERIAL NOS. B89C-3299 AND A146C-1545.~~

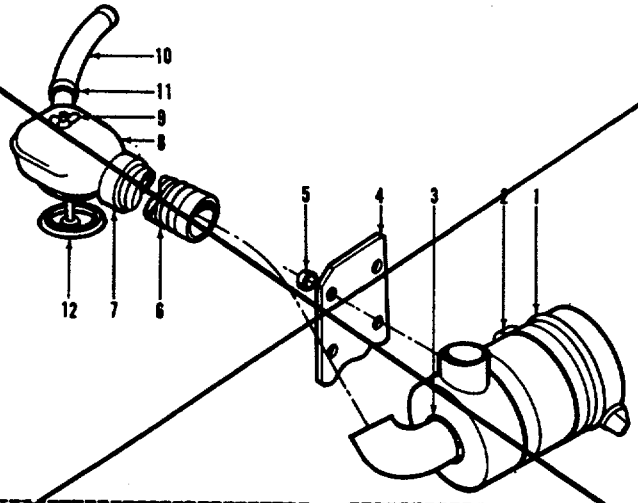


REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	18497	CAPSCREW-5/16 UNC X 1	4
1	15155	LOCKWASHER-5/16	4
2	169092	TUBE-AIR INLET	1
3	115696	CLAMP-HOSE	2
4	169095	HOSE	1
5	169100	MANIFOLD-AIR CLEANER	1
6	169098	HOSE	2
7	112989	CLAMP	4
8	169096	AIR CLEANER	2
8	234718	BAR-RETAINER	1
8	234719	ELEMENT	1
8	138253	UNLOADER	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
8	130845	CLAMP	1
9	169099	BRACKET-AIR CLEANER	1
10	168843	BRACKET-MOUNTING	1
11	16691	CAPSCREW-5/16 UNF X 7/8	4
11	15155	LOCKWASHER-5/16	4
11	15005	NUT-5/16 UNF	4
12	16374	CAPSCREW-5/16 UNC X 5/8	4
12	15155	LOCKWASHER-5/16	4
13	170306	GASKET	1
14	16187	BUSHING	1
15	168846	RESTRICTION INDICATOR KIT	1

AIR FILTER

FOR GAS ENGINE
FIRST USED ON SERIAL NO. B89C-3300 AND A146C-1546

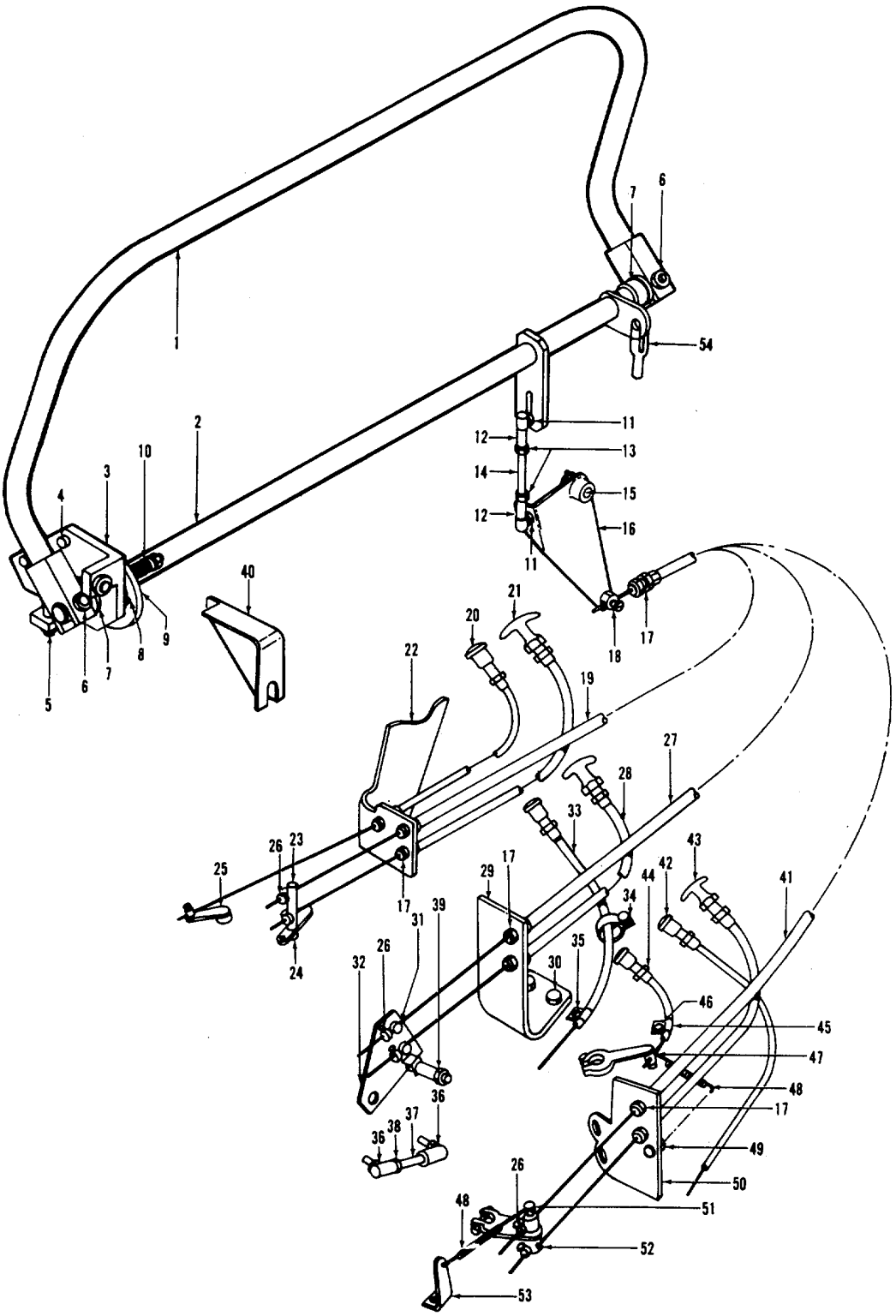


REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	223137	AIR CLEANER-SEE 1D08	1
2	169428	BRACKET-AIR CLEANER	2
3	115696	CLAMP	1
4	391055	PLATE-SUPPORT	1
5	16828	CAPSCREW-3/8 UNC X 1 1/4	4
5	17428	NUT-3/8 UNC	4
6	390370	HOSE	1
7	112989	CLAMP	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
8	157116	ELBOW	1
9	17443	WING NUT-5/16 UNC	1
9	183586	WASHER-SEALING	1
9	164222	LINK	1
9	145639	LOCKNUT	1
10	163730	HOSE	1
11	127045	CLAMP-HOSE	2
12	181329	GASKET	1

THROTTLE LINKAGE

FIRST USED ON SERIAL NO. 889C-3401 AND A146C-1700



THROTTLE LINKAGE

FIRST USED ON SERIAL NO. 889C-3401 AND A146C-1700

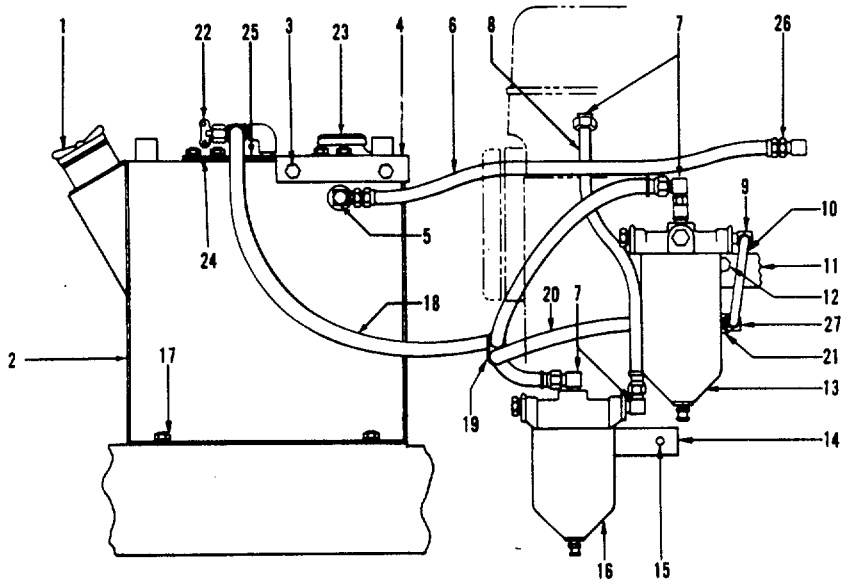
KEY
~~A-FOR 4-236 DIESEL ENGINE.~~
~~B-FOR GAS ENGINE.~~
C-FOR 3-53 DIESEL ENGINE.

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	QTY. B	QTY. C
1	391649	LEVER		1	1
2	391569	SHAFT		1	1
3	391729	SUPPORT-L.H.		1	1
4	16598	CAPSCREW-3/8 UNC X 7/8		2	2
4	15156	WASHER-3/8		2	2
5	16215	CAPSCREW-3/8 UNC X 1		2	2
5	15086	NUT-3/8 UNC		2	2
6	16816	CAPSCREW-3/8 UNC X 1 3/4		2	2
6	15156	WASHER-3/8		2	2
6	15056	NUT-3/8 UNC		2	2
7	157938	BUSHING-FLANGED		2	2
8	157587	DISK		1	1
8	19880	PIN		1	1
9	157588	PLATE		1	1
10	157942	STUD-SPECIAL		2	2
10	177964	SPRING		2	2
10	15127	WASHER-1/4		2	2
10	15004	NUT-1/4 UNF		2	2
11	15004	NUT-1/4 UNF		2	2
11	15912	WASHER-1/4		2	2
12	161607	JOINT-BALL		2	2
12	15127	WASHER-1/4		2	2
13	15024	NUT-1/4 UNF		2	2
14	157954	LINK		1	1
15	213892	BEARING		1	1
15	15134	WASHER-3/8		1	1
15	15212	COTTER		1	1
16	213894	CRANK		1	1
17	15026	NUT-3/8 UNF		4	4
17	15156	WASHER-3/8		4	4
18	161606	SWIVEL		1	1
18	16752	SCREW-#10 UNF X 3/8		1	1
18	15127	WASHER-1/4		1	1
18	15200	COTTER		1	1
~~19~~	~~161613~~	~~CABLE~~			
~~20~~	~~213256~~	~~CABLE-CONTROL~~			
~~21~~	~~213265~~	~~CABLE-THROTTLE~~			
~~22~~	~~.....~~	~~BRACKET-AIR CLEANER, 1006~~			
~~23~~	~~165308~~	~~PIN-THROTTLE LEVER~~			
~~24~~	~~15127~~	~~WASHER-1/4~~			

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	QTY. B	QTY. C
~~24~~	~~221541~~	~~NUT-1/4 UNC~~			
~~25~~	~~.....~~	~~LEVER-CONTROL, 1D19 REF 66~~			
26	154565	STOP-WIRE		2	2
~~27~~	~~161613~~	~~CABLE~~			
28	213264	CABLE-THROTTLE			
29	164473	PLATE			
30	18536	CAPSCREW-3/8 UNF X 5/8		2	
30	15156	WASHER-3/8		2	
31	161606	SWIVEL			
31	15200	COTTER			
32	164400	CRANK			
33	213255	CABLE-CONTROL			
34	153070	CLAMP			
34	15512	CAPSCREW-1/2 UNC X 3/4			
34	15158	LOCKWASHER-1/2			
35	16651	SCREW-#10			
36	161252	STUD-BALL			
36	15923	LOCKWASHER-1/4		2	
36	15004	NUT-1/4 UNF		2	
37	164221	LINK			
38	15002	NUT-#10 UNF			
39	18542	CAPSCREW-3/8 UNC 3 1/2			
39	145641	NUT-3/8 UNC			
~~40~~	~~391272~~	~~SHROUD~~			
41	169140	CABLE			1
42	.....	CABLE-EMERGENCY STOP			1
43	213266	CABLE-THROTTLE			1
44	213257	CABLE-CONTROL			1
45	124359	CLAMP			1
46	15127	WASHER-1/4			1
47	169135	SWIVEL			1
48	154560	SPRING			2
49	15002	NUT-#10 UNF			1
49	16701	SCREW-#10 UNF X 1			1
50	169134	BRACKET			1
51	16708	SCREW-#10 UNF X 1/2			1
51	15002	NUT-#10 UNF			1
52	15200	PIN-COTTER			1
53	169136	BRACKET			1
54	.....	ROD END-SEE 2A10 REF 13			1

FUEL SYSTEM

FOR 3-53 DIESEL ENGINE



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	157704	CAP	1
1	67353	GASKET	1
2	181771	TANK-FUEL	1
3	15055	NUT-5/16 UNC	2
3	15155	LOCKWASHER-5/16	2
3	18515	WASHER-5/16	2
4	164363	TIE-CONSOLE	1
5	14271	ELBOW	1
6	169119	HOSE	1
7	14358	ELBOW-45 DEGREE	3
7	160622	VALVE-CHECK	1
8	172833	HOSE	1
9	14273	ELBOW	1
10	154494	TUBE	1
11	169120	BRACKET	1
12	16377	CAPSCREW-7/16 UNC X 1 G5	2
12	15157	LOCKWASHER-7/16	2
13	.....	FILTER-PRIMARY, COMES W/ENGINE	1

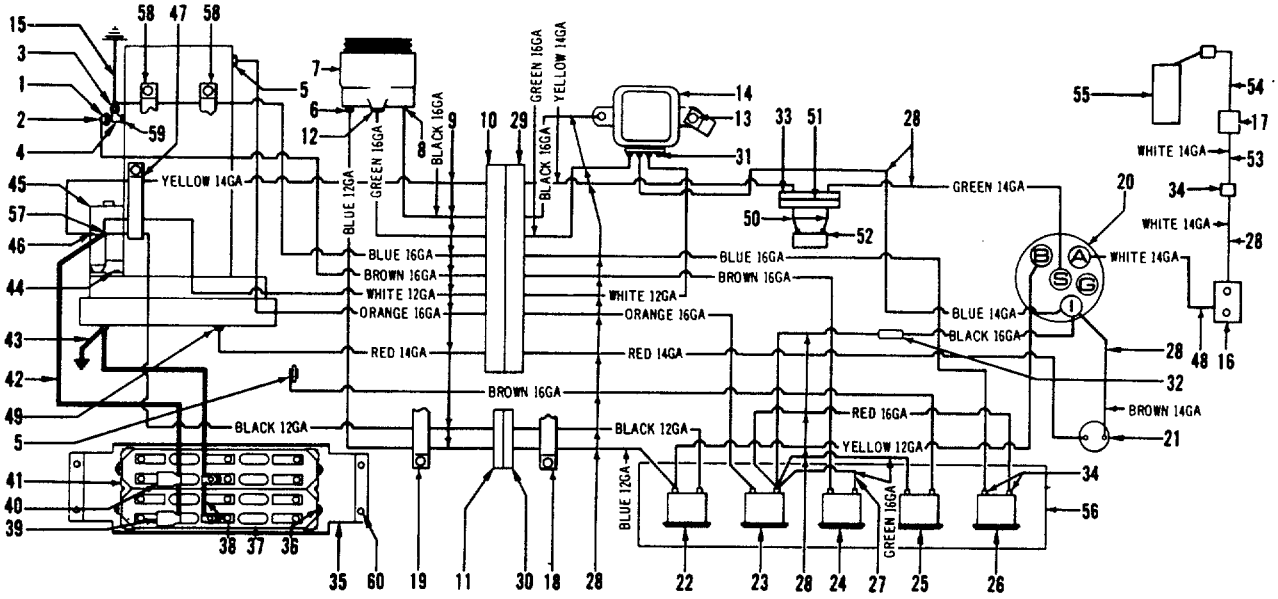
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
13	15056	NUT-3/8 UNC, FILTER MOUNTING	2
13	15156	LOCKWASHER-3/8, FILTER MOUNTING	2
13	15129	WASHER-7/16, FILTER MOUNTING	2
14	169122	BRACKET	1
15	16805	CAPSCREW-3/8 UNC X 1 G5	2
15	16815	CAPSCREW-3/8 UNC X 1 1/2 G5	1
15	15156	LOCKWASHER-3/8	3
16	.....	FILTER-SECONDARY, COMES W/ENGINE	1
17	156133	LOCKNUT-3/8 UNC	4
18	169446	HOSE	1
19	119074	CLAMP	2
20	169118	HOSE	1
21	16863	ELBOW-45 DEGREE	2
22	16192	VALVE-SHUT OFF	1
22	15360	ELBOW	1
23	156606	GAUGE-FUEL LEVEL	1
26	16101	CONNECTOR	1
27	14274	ELBOW	1

ELECTRICAL SYSTEM

ALTERNATOR 1F09
DISTRIBUTOR 1F04
~~ELECTRICAL SYSTEM-GAS ..... 1F03~~
ELECTRICAL SYSTEM-DSL 1F05
HORN 1F08
STARTING MOTOR 1F07

ELECTRICAL SYSTEM

FOR DIESEL ENGINE



KEY

~~4-FOR 4-236 DIESEL ENGINE.~~

8-FOR 3-53 DIESEL ENGINE.

REF. NO.	HYSTER PART NO.	NAME OF PART	1	2	3	4	QTY.	8
1	169776	SENDER-PRESSURE					1	1
2	15002	NUT-#10 UNF					1	1
2	15916	LOCKWASHER-#10					1	1
~~3~~	~~981878~~	~~SENDER-HOUR METER~~					~~1~~	~~1~~
3	55983	SWITCH-PRESSURE	•				1	1
4	16186	TEE					1	1
4	16151	ELBOW	•				1	1
4	15372	NIPPLE-LONG	•				1	1
5	77328	SENDER-TEMPERATURE					2	2
5	15002	NUT-#10 UNF					2	2
5	15916	LOCKWASHER-#10					2	2
~~6~~	~~120436~~	~~NUT-#12 UNC~~					~~1~~	~~1~~
~~6~~	~~15915~~	~~LOCKWASHER-1/4~~					~~1~~	~~1~~
6	157065	BOOT-PROTECTOR					1	1
7	.....	ALTERNATOR-SEE 1F09					1	1
~~8~~	~~15002~~	~~NUT-#10 UNF~~					~~2~~	~~2~~
~~8~~	~~15916~~	~~LOCKWASHER-#10~~					~~2~~	~~2~~
~~9~~	~~166021~~	~~HARNESS-WIRING, ENGINE~~					~~1~~	~~1~~
9	169152	HARNESS-WIRING, ENGINE	•				1	1
10	134813	CONNECTOR					1	1
11	152728	CONNECTOR					1	1
12	126381	CONNECTOR					1	1
13	18460	CAPSCREW-1/4 UNC X 3/4 G5					2	2
13	15054	NUT-1/4 UNC					2	2
13	15154	LOCKWASHER-1/4					2	2
13	173247	CLAMP					1	1
14	134796	REGULATOR-VOLTAGE					1	1
15	132853	WIRE	•				1	1
16	168421	SWITCH-TOGGLE, SPRAY PUMP					1	1
17	163762	BREAKER-CIRCUIT					1	1
17	15002	NUT-#10 UNF					2	1
17	15052	NUT-#10 UNC					1	1
17	15916	LOCKWASHER-#10					3	1
~~18~~	~~154208~~	~~CLAMP~~					~~1~~	~~1~~
18	128408	CLAMP	•				1	1
18	16378	CAPSCREW-1/4 UNC X 5/8 G5	•				1	1
18	15154	LOCKWASHER-1/4	•				1	1
18	15054	NUT-1/4 UNC	•				1	1
19	136516	CLAMP	•				1	1
19	16597	CAPSCREW-3/8 UNC X 3/4 G5	•				1	1
19	15156	LOCKWASHER-3/8	•				1	1
20	186305	SWITCH-IGNITION AND START					1	1
20	186304	KEY-IGNITION					1	1
~~21~~	~~90541~~	~~SWITCH-COLD START~~					~~1~~	~~1~~
~~21~~	~~104293~~	~~PLATE-DIESEL~~					~~1~~	~~1~~
22	169758	AMMETER					1	1
23	169779	GAUGE-WATER TEMPERATURE					1	1
24	169759	GAUGE-OIL PRESSURE					1	1
25	170805	GAUGE-TRANSMISSION TEMP.					1	1
26	119379	METER-HOUR					1	1
27	87415	WIRE					1	1
~~28~~	~~104830~~	~~HARNESS-WIRING, INSTRUMENT~~					~~1~~	~~1~~
28	184825	HARNESS-WIRING, INSTRUMENT	•				1	1
29	134814	CONNECTOR					1	1
30	126319	CONNECTOR					1	1
31	126380	CONNECTOR-REGULATOR					1	1
32	148767	HOLDER-FUSE					1	1
32	53123	FUSE-5 AMP.					1	1
33	148659	CONNECTOR					1	1
34	121384	CONNECTOR					3	3
35	183575	BRACKET					1	1
36	391826	BOLT-5/16 UNC X 9					4	4
36	18515	WASHER-5/16					4	4
36	17443	NUT-WING, 5/16 UNC					4	4
37	79792	BATTERY-12 VOLT					2	2
~~38~~	~~166196~~	~~CABLE-BATTERY~~					~~1~~	~~1~~
38	169156	CABLE-BATTERY	•				1	1
39	111770	PROTECTOR					1	1
40	147633	PROTECTOR					1	1
41	74751	HOLD DOWN-BATTERY					2	2
~~42~~	~~166195~~	~~CABLE-BATTERY~~					~~1~~	~~1~~
42	169155	CABLE-BATTERY	•				1	1

ELECTRICAL SYSTEM

FOR DIESEL ENGINE

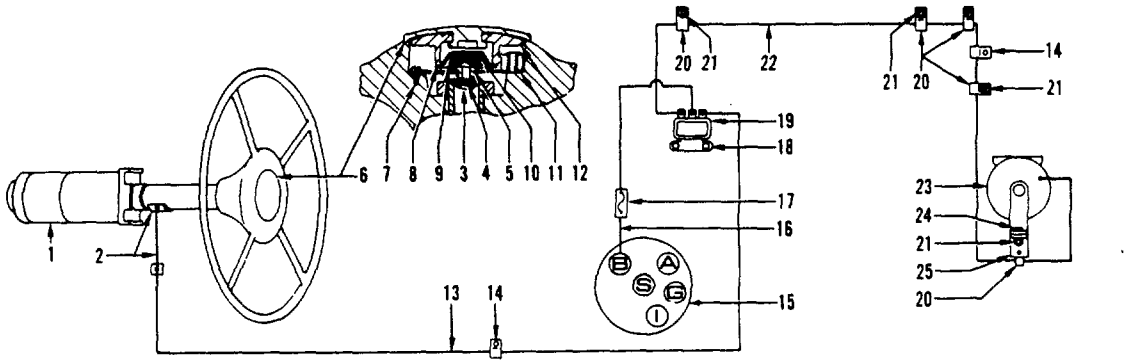
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. B
43	101618	CABLE-GROUND	1
~~44~~	~~16020~~	~~CAPSCREW 3/8 UNC X 1 1/4 GR5~~	~~..~~
~~44~~	~~15156~~	~~LOCKWASHER 3/8~~	~~..~~
~~45~~	~~.....~~	~~MOTOR-STARTING SEE 1F07~~	~~..~~
45	.....	MOTOR-STARTING, COMES WITH ENGINE	1
~~46~~	~~15039~~	~~NUT #8 UNC~~	~~..~~
~~46~~	~~15919~~	~~LOCKWASHER #8~~	~~..~~
47	132131	CLAMP	1
48	181898	WIRE	1
~~49~~	~~.....~~	~~THERMOSTART SEE 1B14 REF. 17~~	~~..~~
50	391750	HARNESS-WIRING	1
51	148658	CONNECTOR	1
52	.....	SWITCH-MICRO, SEE 2C03 REF 48	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. B
53	393091	WIRE	1
54	393092	WIRE	1
55	.....	PUMP-SPRAY, PAGE B3 REF. 33	1
56	215017	PLATE-NAME	1
57	204223	BOOT	1
~~57~~	~~15086~~	~~NUT-JAM, 3/8 UNC~~	~~..~~
~~57~~	~~15156~~	~~LOCKWASHER-3/8~~	~~..~~
~~58~~	~~124297~~	~~CLAMP~~	~~..~~
58	132972	CLAMP	2
~~58~~	~~15623~~	~~CAPSCREW-3/8 UNF X 5/8~~	~~..~~
~~58~~	~~15156~~	~~LOCKWASHER-3/8~~	~~..~~
~~59~~	~~16148~~	~~NIPPLE~~	~~..~~
60	156133	NUT-3/8 UNC	4

STARTING MOTOR

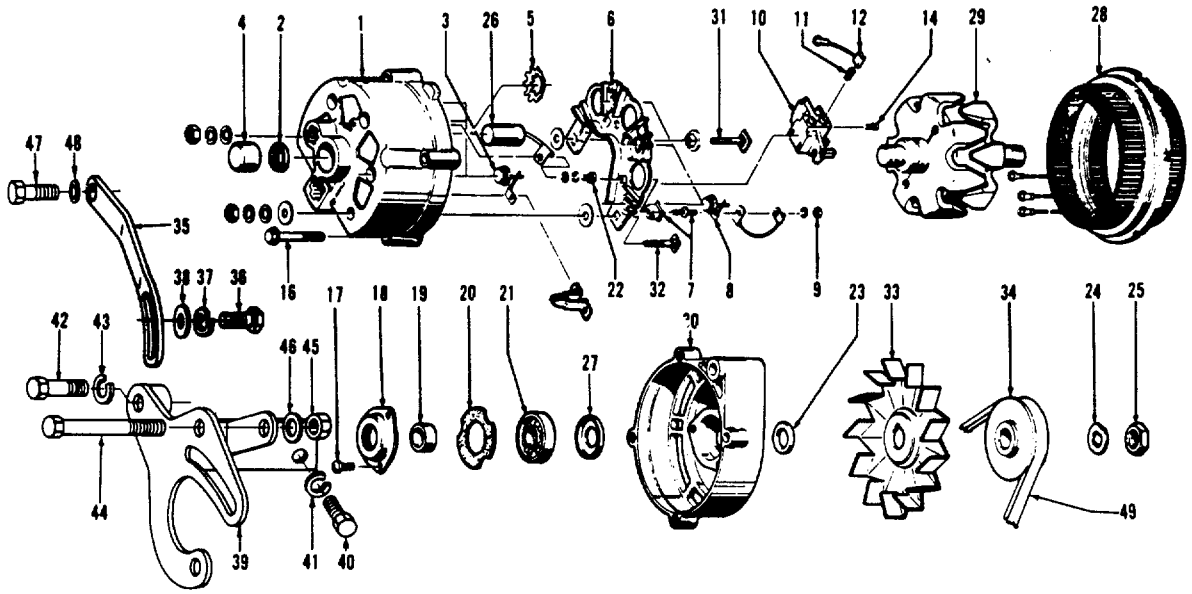
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	QTY. B
50	166541	HOUSING-DRIVE END	1	..
50	172812	BUSHING	1	..
50	137699	HOUSING-DRIVE END	..	1
50	55585	BUSHING	..	1
51	236078	STUD-SHIFT LEVER	1	1
52	97497	WASHER-THRUST	1	..
52	137698	WASHER-THRUST	..	1
53	97498	RING-RETAINING	1	..
53	236081	RING-RETAINING	..	1
54	97499	COLLAR	1	..
54	236082	COLLAR	..	1
55	55894	PIN-DOWEL	1	1
56	156289	DRIVE	1	..
56	97360	DRIVE	..	1
56	166337	BUSHING-OILLESS	..	1
57	166336	SPRING	..	1
58	55590	COLLAR	1	..
58	166479	LOCKWIRE	1	1
59	123675	PLATE-CENTER BEARING	..	1
59	131174	SEAL-OIL	..	1
59	131172	BUSHING	..	1
59	131173	GASKET	..	1
59	55978	WASHER-CENTER BEARING	..	1
60	151840	GROMMET-FIELD FRAME	1	..
60	167010	GROMMET-FIELD FRAME	..	1
62	151837	INSULATION-FIELD COIL	4	..
63	16598	CAPSCREW-3/8 UNC X 7/8 G5	2	2
63	16828	CAPSCREW-3/8 UNC X 1 1/4 G5	1	1
64	15156	LOCKWASHER-3/8	3	3

HORN



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4		QTY.
1	.....	CONTROL-STEERING		1
1	.....	COLUMN-STEERING		1
2	.....	BRUSH-HORN		1
3	.....	WASHER-CONTACT	SEE 2D04	1
4	.....	SPRING-CONTACT		1
5	.....	INSULATOR-CONTACT		
5		REF. 32		1
6	163910	KIT-HORN BUTTON		1
6	166169	COVER-WEATHER		1
7	166174	SCREW		3
8	166171	CUP-CONTACT		1
9	166173	CAP-CONTACT		1
10	166172	SPRING		1
11	166175	PLATE-BASE		1
12	166170	BUTTON-HORN		1
13	164766	WIRE		1
14	124359	CLAMP		2
15	.....	SWITCH-IGNITION, SEE 1F03 REF 29		
15		AND 1F05 REF. 20		1
16	121062	WIRE		1
17	53124	FUSE-10 AMP.		1
18	15004	NUT-1/4 UNF		2
18	15912	LOCKWASHER-1/4		2
19	103739	RELAY-HORN		1
20	132131	CLAMP		7
21	15055	NUT		6
21	15913	LOCKWASHER-5/16		6
22	164767	WIRE		1
23	126364	HORN		1
24	16836	CAPSCREW-5/16 UNC X 3/4 G5		1
25	164758	CLIP		1

ALTERNATOR



KEY

~~A-FOR GAS ENGINE.~~

~~B-FOR 4.236 DIESEL ENGINE.~~

C-FOR 3-53 DIESEL ENGINE.

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	B	C
	~~139196~~	~~ALTERNATOR~~			
	.....	ALTERNATOR-COMES W/ENGINE	.	..	1
~~1~~	~~152236~~	~~FRAME-S.R.E.~~			
2	128837	RETAINER-BEARING			..
3	128836	DIODE-NEGATIVE, BLACK			..
4	128838	BEARING-S.R.E.			..
5	128839	SPRING-CAPACITOR			..
6	128844	HEAT SINK			..
7	128846	TERMINAL PACKAGE			..
8	128845	DIODE-POSITIVE			..
9	150019	NUT			..
9	128843	LOCKWASHER			..
10	138559	HOLDER AND BRUSH			..
11	128848	SPRING-BRUSH			..
12	.....	BRUSH			..
14	128851	SCREW			..
14	128842	LOCKWASHER			..
16	128852	BOLT-THRU			..
17	138554	SCREW			..
18	128831	RETAINER-BEARING			..
19	138553	COLLAR-INSIDE			..
20	202004	GASKET			..
21	235950	BEARING-DRIVE END			..
22	16713	SCREW			..
22	128842	LOCKWASHER			..
22	128841	WASHER			..
23	128834	COLLAR-OUTSIDE			..
24	128835	LOCKWASHER			..
25	55580	NUT-SHAFT			..
26	128840	CAPACITOR			..
27	152234	SLINGER-GREASE			..
28	152235	STATOR			..
28	154793	CLIP-STATOR LEAD			..
29	138555	ROTOR			..
30	190047	FRAME-DRIVE END			..
31	152237	TERMINAL PACKAGE-GROUND			..
32	152238	TERMINAL PACKAGE-BATT.			..
32	154794	INSULATOR-BATTERY TERM.			..
32	152239	WASHER-INSULATOR			..
33	126358	FAN			..
34	164083	PULLEY	.	..	..

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	B	C
~~34~~	~~146689~~	~~PULLEY~~			
~~35~~	~~155416~~	~~ARM-ADJUSTING~~			
~~35~~	~~168099~~	~~ARM-ADJUSTING~~			
35	154402	ARM-ADJUSTING	..	..	1
~~36~~	~~18497~~	~~CAPSCREW-5/16 UNC X 1 G5~~			
~~36~~	~~992503~~	~~SET SCREW~~			
36	15639	CAPSCREW-5/16 UNC X 1	.	.	1
37	15155	LOCKWASHER-5/16	..	..	1
~~37~~	~~15156~~	~~LOCKWASHER-3/8~~			
~~38~~	~~15175~~	~~WASHER-5/16~~			
38	18515	WASHER-5/16	.	.	1
~~39~~	~~155437~~	~~BRACKET-ALTERNATOR~~			
~~39~~	~~168095~~	~~BRACKET-ALTERNATOR~~			
39	154399	BRACKET-ALTERNATOR	..	..	1
~~40~~	~~16598~~	~~CAPSCREW-3/8 UNC X 7/8 G5~~			
40	16828	CPSCR.-3/8 UNC X 1 1/4 G5	..	..	3
~~40~~	~~168098~~	~~STUD~~			
~~41~~	~~15156~~	~~LOCKWASHER-3/8~~			
~~41~~	~~992050~~	~~LOCKWASHER~~			
41	177947	LOCKWASHER-3/8	..	..	3
~~41~~	~~17150~~	~~NUT-3/8 UNF~~			
~~41~~ #	~~15006~~	~~NUT~~			
~~42~~	~~16559~~	~~CAPSCREW-7/16 UNC X 1 3/4 G5~~			
42					
42	16805	CAPSCREW-3/8 UNC X 1 G5	..	..	1
~~43~~	~~15157~~	~~LOCKWASHER-7/16~~			
43	15156	LOCKWASHER-3/8	..	..	1
43	15134	WASHER-3/8	..	..	1
~~44~~	~~16741~~	~~CPSCR.-3/8 UNC X 3 1/4 G5~~			
~~44~~	~~17231~~	~~CPSCR.-3/8 UNF X 3 1/2 G5~~			
44	17155	CPSCR.-3/8 UNF X 3 1/4 G5	..	..	1
~~45~~	~~17100~~	~~LOCKNUT-3/8 UNC~~			
45	43740	NUT-3/8 UNF	..	1	1
~~46~~	~~15134~~	~~WASHER-3/8~~			
~~47~~	~~16696~~	~~CAPSCREW-3/8 UNF X 7/8 G5~~			
~~48~~	~~15156~~	~~LOCKWASHER-3/8~~			
49	154382	V-BELT	..	..	1
~~49~~	.....	~~V-BELT, SEE 1005 REF. 63~~			

~~#FIRST USED ON SERIAL NO. B89G 3303.~~

TRANSMISSION AND POWER TRAIN

CONTROL LINKAGE 2A09

FINAL DRIVE-C3508 2805

~~FINAL DRIVE 6340A..... 2807~~

HYDRAULIC MOTOR 2A11

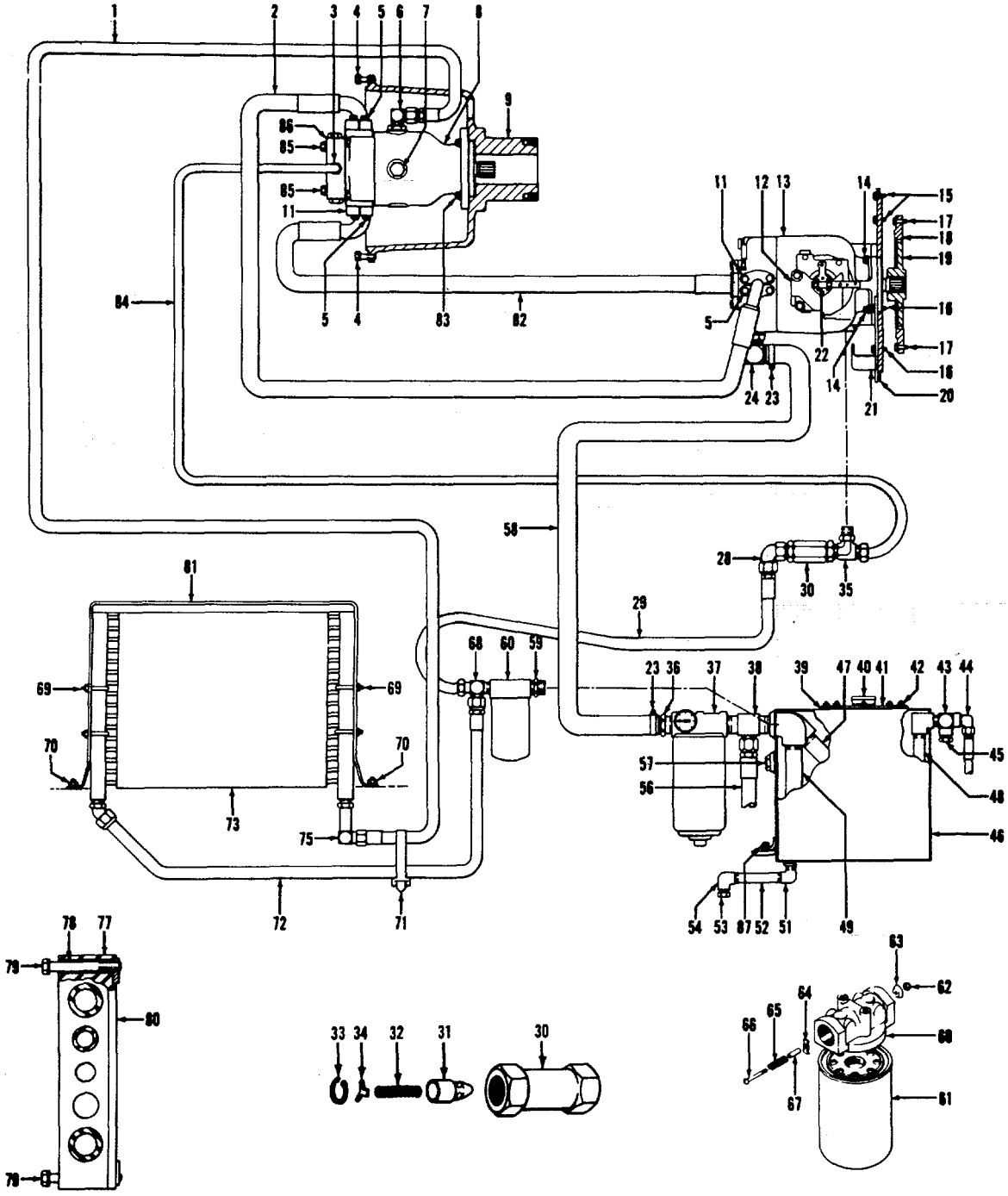
HYDRAULIC PUMP .....2A13 & 2803

HYDRAULIC SYSTEM 2A05

OIL FILTER 2802

SERVO CONTROL VALVE 2801

HYDRAULIC SYSTEM
FIRST USED ON SERIAL NO. 889C-3401 AND A146C-1700



HYDRAULIC SYSTEM

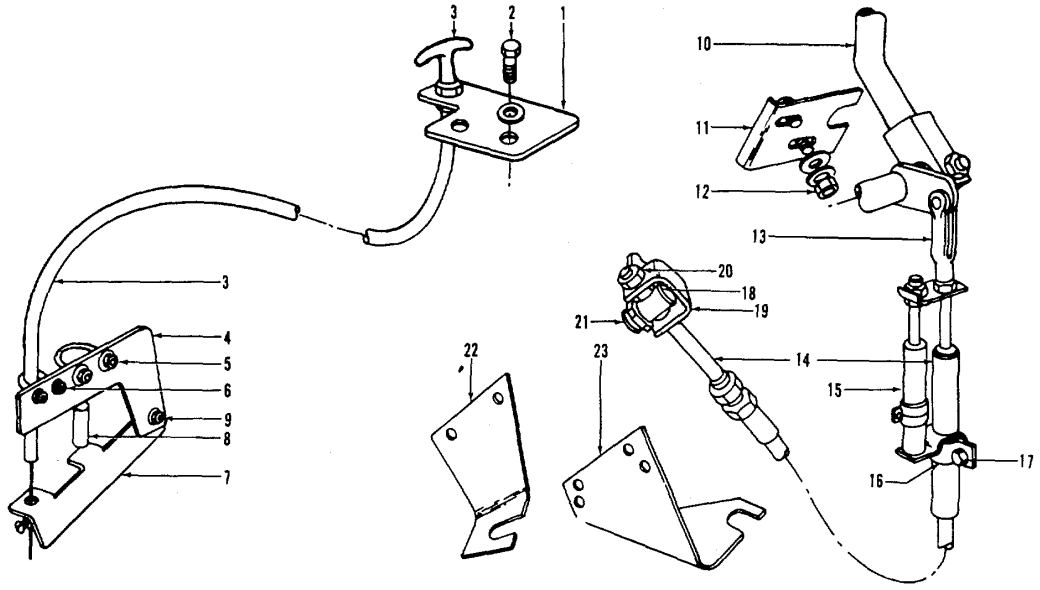
FIRST USED ON SERIAL NO. 889C-3401 AND A146C-1700

KEY
~~A-FOR GAS ENGINE,~~ [redacted]
~~B-FOR 4-236 DIESEL ENGINE,~~
C-FOR 3-53 DIESEL ENGINE.

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	B	C
~~1~~	~~393079~~	~~HOSE~~	~~1~~	~~-~~	~~-~~
1	393082	HOSE	-	-	1
2	393087	HOSE	1	-	1
~~2~~	~~393078~~	~~HOSE~~	~~-~~	~~-~~	~~1~~
3	111331	CONNECTOR	1	-	1
4	.....	CAPSCREW-PG. 2B06 REF. 62	12	12	12
5	18559	CAPSCREW-7/16 UNC X 1 3/4 G5	16	16	16
5	15157	LOCKWASHER-7/16	16	16	16
6	112475	ELBOW	1	-	1
7	14603	PLUG	2	2	2
8	.....	MOTOR-HYDRAULIC, PAGE 2A12	1	-	1
9	.....	CARRIER-MOTOR, PAGE 2B06 REF. 2	1	-	1
11	156690	FLANGE-SPLIT	8	8	8
11	169787	O-RING	4	4	4
13	.....	PUMP-HYDRAULIC, PAGE 2B04	1	-	1
14	221565	CAPSCREW-1/2 UNC X 1 1/4	4	4	4
~~15~~	~~16005~~	~~CAPSCREW-3/8 UNC X 1 G5~~	~~16~~	~~16~~	~~-~~
15	16828	CPSCR.-3/8 UNC X 1 1/4 G5	-	-	8
15	15156	LOCKWASHER-3/8	16	16	8
16	16828	CPSCR.3/8 UNC X 1 1/4 G5	2	2	2
16	16815	CPSCR.3/8 UNC X 1 1/2 G5	-	-	2
16	15156	WASHER-3/8	2	2	4
~~17~~	~~15943~~	~~BOLT-5/8 UNC X 1 1/2~~	~~4~~	~~4~~	~~-~~
17	17112	BOLT-3/8 UNC X 1 1/4	-	-	8
~~18~~	~~156663~~	~~PLATE-DRIVE~~	~~1~~	~~-~~	~~-~~
~~18~~	~~164138~~	~~PLATE-DRIVE~~	~~-~~	~~1~~	~~-~~
18	169144	PLATE-DRIVE	-	-	1
19	392092	HUB	1	-	1
~~20~~	~~213624~~	~~PLATE-MOUNTING~~	~~1~~	~~-~~	~~-~~
~~20~~	~~213627~~	~~PLATE-MOUNTING~~	~~-~~	~~1~~	~~-~~
20	214931	PLATE-MOUNTING	-	-	1
21	.....	BRACKET-PAGE 2A10 REF. 8	1	-	1
22	.....	LEVER-PAGE 2A10 REF. 2	1	-	1
23	130845	CLAMP-HOSE	2	2	2
24	186227	NIPPLE	1	1	1
26	15995	REDUCER	1	1	1
28	17301	ELBOW	1	1	1
29	393080	HOSE	1	1	1
30	187282	VALVE-CHECK	1	1	1
31	190004	POPPET	1	1	1
32	190003	SPRING	1	1	1
33	190001	SNAP RING	1	1	1
34	190002	WASHER	1	1	1
35	186228	FITTING	1	1	1
36	17585	NIPPLE	1	1	1
37	.....	FILTER-OIL, SEE PAGE 2B02	1	1	1
38	177457	TEE-SPECIAL	1	1	
38	168812	FITTING-SPECIAL	-	-	1
39	156607	GASKET	1	1	1
40	164227	CAP-OIL FILLER	1	1	1
40	118742	GASKET	1	1	1
41	156670	COVER-TANK	1	1	1
42	15055	NUT-5/16 UNC	8	8	8
42	15155	LOCKWASHER-5/16	8	8	8
43	156696	TEE	1	1	1
44	17300	ELBOW	1	1	1
~~45~~	~~14588~~	~~PLUG~~	~~-~~	~~-~~	~~-~~
45	17345	CONNECTOR	-	1	1
46	393156	TANK-HYDRAULIC	1	1	1
47	180442	PIPE	1	1	1
48	156655	PIPE	1	1	1
49	156656	PIPE	1	1	1
50	14683	CONNECTOR	1	1	1
51	17324	ELBOW	1	1	1
52	15346	NIPPLE	1	1	1
53	14387	PLUG	1	1	1
54	12818	ELBOW	1	1	1
56	.....	HOSE-SEE PAGE 2D02 REF.26	1	1	1
57	146073	GAUGE-VIEW	1	1	1
58	393254	HOSE	1	1	1
59	17697	NIPPLE-REDUCER	1	1	1
60	180441	FILTER-OIL, RETURN LINE	1	1	1
60	182291	HEAD	1	1	1
61	180595	ELEMENT	1	1	1
62	182293	LOCKNUT	1	1	1
63	182292	VALVE-BY PASS	1	1	1
64	182290	GUIDE-BY PASS	1	1	1
65	182288	SPRING	1	1	1
66	182287	SCREW	1	1	1
67	182289	SPACER	1	1	1
68	14596	TEE	1	1	1
69	190517	J-BOLT	2	2	2
69	190515	U-BOLT	-	2	2
69	221341	NUT-1/4 UNC	4	4	4
69	197068	WASHER-1/4	-	4	4
~~70~~	~~145641~~	~~NUT-3/8 UNC~~	~~4~~	~~-~~	~~-~~
~~70~~	~~15134~~	~~LOCKWASHER-3/8~~	~~4~~	~~-~~	~~-~~
71	129563	CLAMP-STRAP	1	1	1
71	176451	CLAMP	-	1	1
71	15512	CAPSCREW-1/2 UNC X 3/4	-	-	1
71	15158	LOCKWASHER-1/2	-	-	1
~~72~~	~~205698~~	~~HOSE~~	~~-~~	~~-~~	~~-~~
72	393081	HOSE	-	1	1
73	186259	COOLER-OIL	1	1	1
75	82426	ELBOW	2	2	2
77	391075	BLOCK-RUBBER	1	1	1
78	391076	SPACER	2	2	2
79	18540	CAPSCREW-3/8 UNC X 3 G5	2	2	2
79	15056	NUT-3/8 UNC	2	2	2
80	215041	CHANNEL	1	1	1
~~81~~	~~186260~~	~~BRACKET-SUPPORT~~	~~-~~	~~-~~	~~-~~
82	393086	HOSE	1	-	1
~~83~~	~~393071~~	~~HOSE~~	~~-~~	~~1~~	~~1~~
83	.....	CAPSCREW-PG. 2B06 REF. 61	4	4	4
84	393078	HOSE	1	-	1
85	.....	CAPSCREW-PG. 2A11 REF. 2	6	6	6
86	.....	VALVE-SEE PG. 2A11 REF. 1	1	1	1
87	145641	NUT-3/8 UNC	4	4	4
87	15134	LOCKWASHER-3/8	4	4	4

CONTROL LINKAGE

FIRST USED ON SERIAL NO. B89C-3401 AND A146C-1700

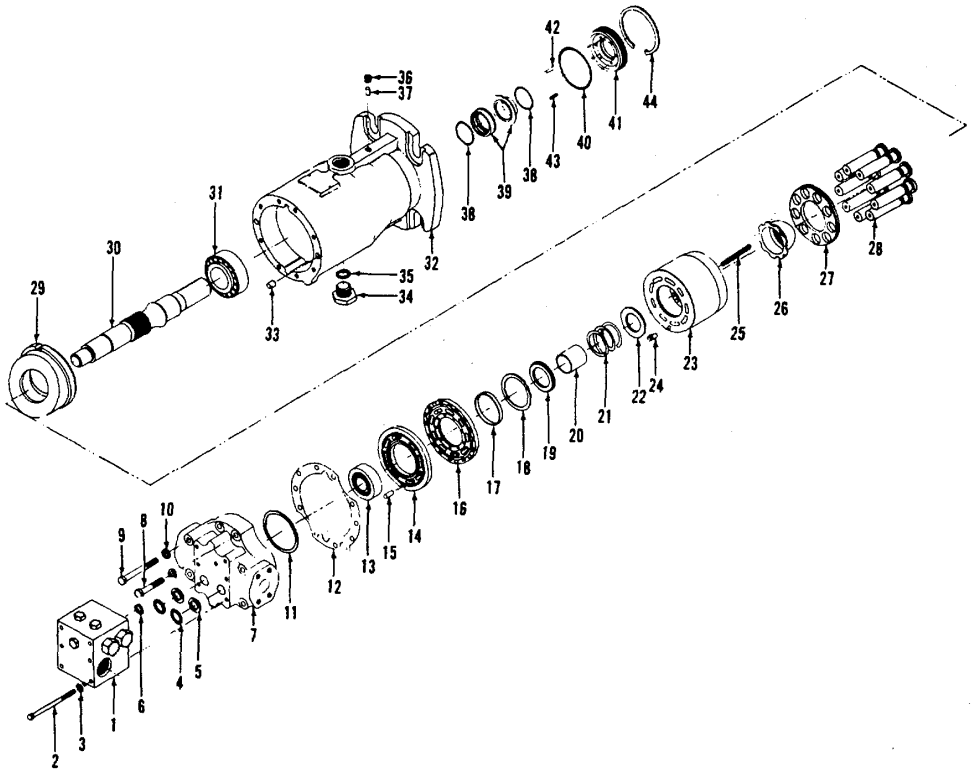


REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
~~1~~	~~* 393531~~	~~PLATE~~	~~1~~
1	.....	BRACKET-BATTERY, SEE 1F05	1
~~2~~	~~* 16036~~	~~SCREW-5/16 UNC X 3/4~~	~~2~~
~~2~~	~~* 15155~~	~~WASHER-5/16~~	~~2~~
3	391471	CABLE-PULL	1
4	393529	PLATE	1
5	393532	U-BOLT	1
5	15175	WASHER-5/16	2
6	213897	U-BOLT	1
6	15155	WASHER-5/16	2
7	393530	LEVER	1
8	222707	PIN	1
9	85749	SCREW-SHOULDER	1
9	15175	WASHER-5/16	1
9	18515	WASHER-5/16	1
9	15154	WASHER-1/4	1
9	15000	NUT-1/4 UNC	1
10	.....	LEVER-SEE 1D10 REF. 1	1
11	393305	PLATE-LOCK	1
12	85749	SCREW-SHOULDER	2
12	18515	WASHER-5/16	2
12	393307	WASHER-SPRING	2
12	18500	WASHER-#12	2
12	15154	WASHER-1/4	2
12	15000	NUT-1/4 UNC	2
13	125	ROD END	1
13	213896	PIN-ROD	1
13	15200	PIN-COTTER	1
14	393085	CABLE-PUSH PULL	1
15	392015	SWITCH	1
16	392016	CLAMP	1
17	220501	SCREW-#10 UNC X1	2
17	15002	NUT-#10 UNC	2
17	391727	SPACER	2
18	382019	SWIVEL	1
19	392018	BRACKET	1
20	15024	NUT-1/4 UNF	2
21	54115	SNAP RING	1
~~22~~	~~* 393604~~	~~BRACKET~~	~~1~~
23	393322	BRACKET	1

~~*USED ON GAS ENGINE ONLY.~~
~~#USED ON 4-236 OR 3-53 DIESEL ENGINE.~~

HYDRAULIC MOTOR

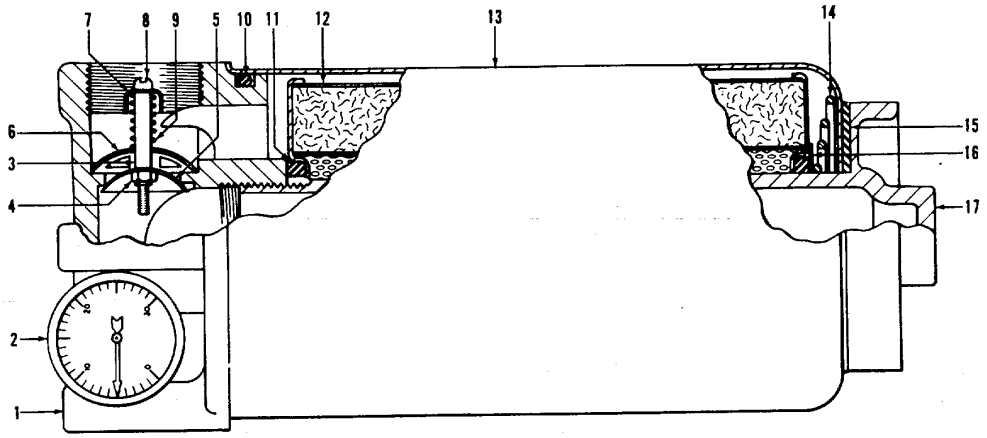
FIRST USED ON SERIAL NO. B89C-3401 AND A146C-1700



REF. NO.		HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
		393467	MOTOR-HYDRAULIC	1
1	*	267026	VALVE-MANIFOLD	1
2	*	18524	CAPSCREW-5/16 UNC X 3 3/4	6
3	*	194402	WASHER	6
4	¤*	265732	O-RING	2
5	¤*	165064	RING-BACK UP	2
6	¤*	39767	O-RING	1
7		194394	END CAP-MOTOR	1
8		16376	CAPSCREW-3/8 UNC X 2	3
9		18540	CAPSCREW-3/8 UNC X 3	5
10		190583	WASHER	8
11		190585	SHIM	AR
12		190586	GASKET-END CAP	1
13		190587	BEARING-REAR	1
14		194395	PLATE-VALVE	1
15		222710	PIN	1
16	#	190591	PLATE-BEARING	1
17	#	267028	PILOT-BEARING PLATE	1
18	#	190593	RING-RETAINING	1
19	#	190594	RETAINER-SPRING	1
20	#	190595	GUIDE-SPRING	1
21	#	267029	SPRING-CYLINDER BLOCK	1
22	#	190597	SEAT-SPRING	1
23	#	.....	BLOCK-CYLINDER	1
24	#	190599	PIN	1
25	#	267030	SPRING-RETAINER	6
26	#	190601	GUIDE-SLIPPER RETAINER	1
27	#	190602	RETAINER-SLIPPER	1
28	#	267031	PISTON	9
29		194396	SWASHPLATE-FIXED	1
30		194397	SHAFT-MOTOR	1
31		190625	BEARING-FRONT	1
32		194398	HOUSING-FIXED	1
33		222719	PIN	2
34		216590	PLUG	1
35		16485	O-RING	1
36		15483	PLUG	1
37		184055	PIN	1
38	%	265788	O-RING	2
39	%	190643	SEAL SET	1
40	%	15880	O-RING	1
41	%	190647	RETAINER-SEAL	1
42	%	226832	PIN-GROOVE	1
43	%	190644	SPRING-SEAL	6
44	%	190648	RING-RETAINING	1

*INCLUDED IN MANIFOLD VALVE KIT 267025.
¤INCLUDED IN VALVE SEAL KIT 194393.
#INCLUDED IN CYLINDER BLOCK KIT 267027.
%INCLUDED IN SEAL KIT 190641.

OIL FILTER



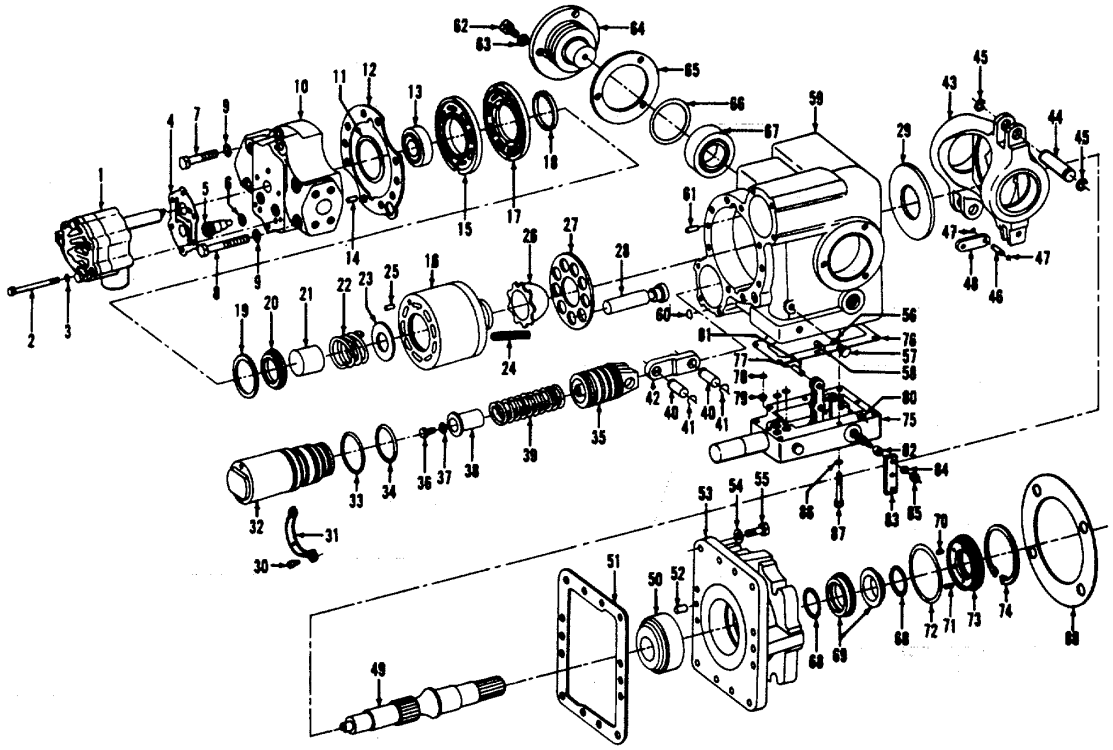
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
	215015	FILTER-OIL	1
1	161146	HEAD & PLUG	1
2	161152	INDICATOR	1
3	195033	SPACER-BY-PASS VALVE	1
3	237017	SPACER-BY-PASS VALVE, 5 PSI	1
4	161161	LOCKNUT-BY-PASS	1
5	161160	VALVE-BY-PASS	1
6	161156	GUIDE-BY-PASS	1
7	161158	CAP-STEM, BY-PASS	1
8	161159	SCREW-BY-PASS	1
9	.....	SPRING-BY-PASS	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
10	* 161154	O-RING, HOUSING	1
11	* 161150	SEAL-OIL	2
12	* 161155	ELEMENT	1
13	161148	HOUSING	1
14	161149	SPRING-ELEMENT	1
15	* 161153	GASKET-CENTER POST	1
16	161151	WASHER-BACK UP	1
17	161147	POST-CENTER	1
20	237011	POST-CENTER, HEAVY DUTY	1

*INCLUDED IN SEAL AND ELEMENT KIT 237014.

HYDRAULIC PUMP

FIRST USED ON SERIAL NO. B89C-3401 AND A146C-1700



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
	185902	PUMP-HYDRAULIC	1
1	190573	PUMP-CHARGE	1
1	190576	PUMP	1
2	18478	CAPSCREW-1/4 UNC X 3 G5	4
3	221763	WASHER	4
4	190577	GASKET	1
5	190578	VALVE-CHECK	2
6	190580	O-RING	1
7	190581	CAPSCREW	3
8	190582	CAPSCREW	5
9	190583	WASHER	8
10	190584	CAP-END	1
11	190585	SHIM	AR
12	190586	GASKET-END CAP	1
13	190587	BEARING	1
14	190588	PIN	1
15	190589	PLATE-VALVE	1
16	190590	CYLINDER BLOCK	1
16	190600	BLOCK	1
17	190591	PLATE-BEARING	1
18	190592	PILOT	1
19	190593	RING-RETAINING	1
20	190594	RETAINER-SPRING	1
21	190595	GUIDE-SPRING	1
22	190596	SPRING-CYLINDER BLOCK	1
23	190597	SEAT-SPRING	1
24	190598	SPRING-RETAINER	9
25	190599	PIN	1
26	190601	GUIDE-RETAINER	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
27	190602	RETAINER-SLIPPER	1
28	190603	PISTON	9
29	190604	PLATE-THRUST	1
30	190605	CAPSCREW	4
31	190606	RETAINER-SLEEVE	2
32	190607	SLEEVE-SERVO	1
32	218051	SLEEVE	2
33	39673	O-RING	1
34	39671	O-RING	1
35	190611	PISTON-SERVO	2
35	190616	PISTON	2
36	190612	CAPSCREW	1
37	190613	WASHER	1
38	190614	GUIDE-SPRING	1
39	190615	SPRING	1
40	190617	PIN	2
41	190618	RING-RETAINING	4
42	190619	LINK	1
43	190620	PLATE-SWASH	1
44	190617	PIN	2
45	190618	RING-RETAINING	4
46	190621	PIN	1
47	190622	RING-RETAINING	2
48	190623	LINK	1
49	190624	SHAFT-DRIVE	1
50	190625	BEARING	1
51	190626	GASKET	1
52	190627	PIN	2
53	190628	COVER-FRONT	1

HYDRAULIC PUMP

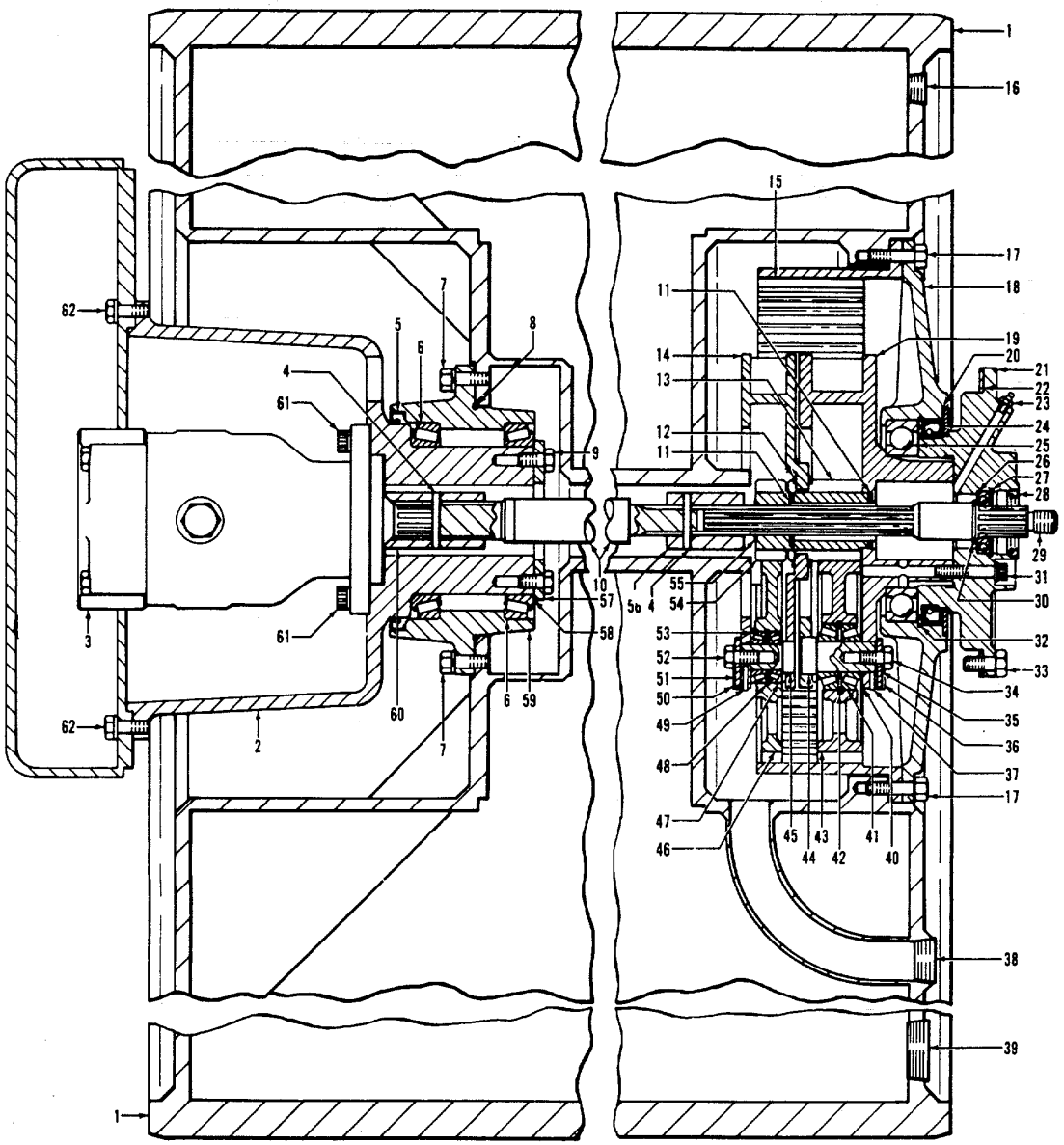
FIRST USED ON SERIAL NO. 889C-3401 AND A146C-1700

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
54	190583	WASHER	12
55	190629	CAPSCREW	12
56	190630	O-RING	1
57	14591	PLUG	1
58	15483	PLUG	1
59	190633	HOUSING	1
60	39347	O-RING	1
61	190635	PIN	2
62	190636	CAPSCREW	6
63	190583	WASHER	6
64	190637	TRUNNION	2
65	190638	SHIM	AR
66	190639	O-RING	2
67	190640	BEARING	2
68	* 190642	O-RING	2
69	* 190643	SEAL	1
70	* 190645	PIN	1
71	* 190644	SPRING-SEAL	6
72	* 190646	O-RING	1
73	* 190647	RETAINER-SEAL	1
74	* 190648	RING-RETAINING	1
75	190649	VALVE-CONTROL	1
75	190653	VALVE	1
76	190650	GASKET	1
77	190651	PIN	1
78	39347	O-RING	3
79	190652	ORIFICE	1
80	221763	WASHER	1
81	190654	COTTER	1
82	190655	SPACER	1
83	.....	HANDLE-SEE 2A10	1
84	15923	WASHER	1
85	190658	NUT	1
86	190575	WASHER	9
87	18473	CAPSCREW	9
88	185903	GASKET	1

*INCLUDED IN SEAL KIT 190641.

FINAL DRIVE

FOR C3508



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	178149	DRUM-DRIVE	1
~~2~~	~~213609~~	~~CARRIER-MOTOR~~	~~1~~
2	390453	CARRIER-MOTOR	1
3	.....	MOTOR-HYDRAULIC-SEE 2A11 & 2A12	1
~~4~~	~~183547~~	~~PIN~~	~~2~~
4	198214	PIN	2
5	150194	SEAL-OIL	1
6	155369	CONE-BEARING	2

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
6	155370	CUP-BEARING	2
7	16823	CAPSCREW-5/8 UNF X 1 1/2 G5	8
7	15160	LOCKWASHER-5/8	8
8	94086	O-RING	1
9	56998	BOLT-1/2 UNC X 1 1/4 G8	6
~~10~~	~~391896~~	~~SHAFT-DRIVE~~	~~1~~
10	393059	SHAFT-DRIVE	1

FINAL DRIVE

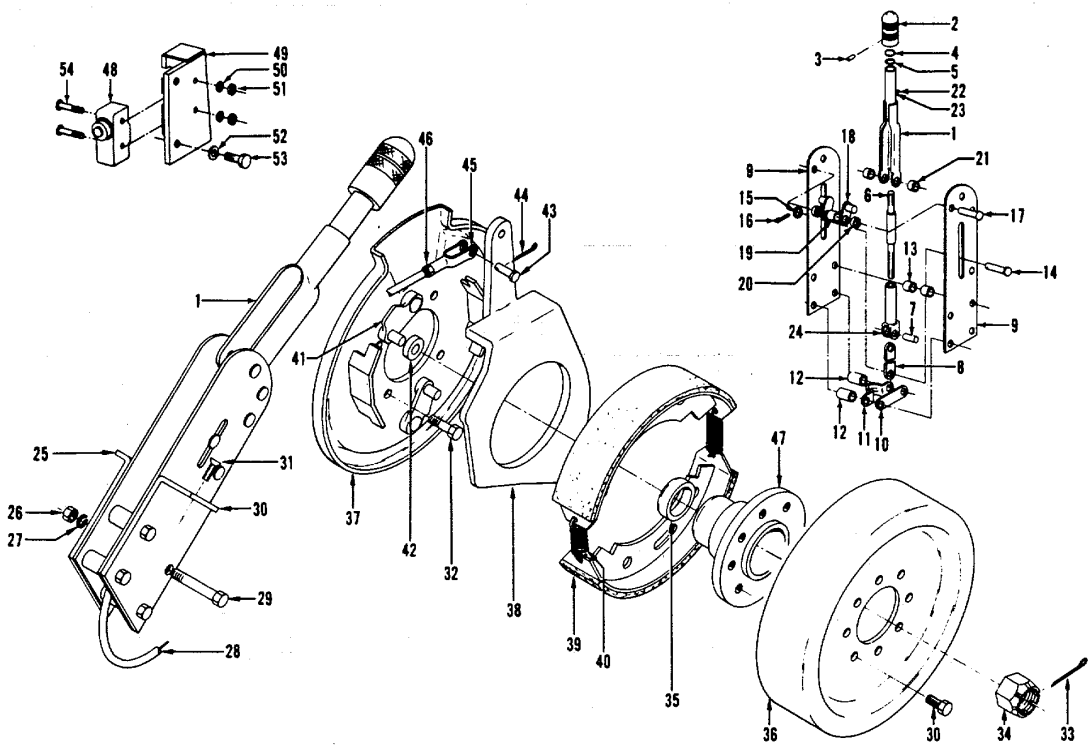
FOR C3508

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
11	167458	WASHER	2
11	78826	BEARING-THRUST	2
12	156201	SNAP RING	2
13	167459	GEAR-SUN	1
14	156174	CARRIER-PLANETARY	1
15	154029	GEAR-RING	1
16	15316	PLUG	1
17	97577	BOLT-1/2 UNF X 1 3/4 G8	16
18	154028	HUB	1
19	156187	CARRIER-PLANETARY	1
~~20~~	~~156204~~	~~PLATE~~	~~1~~
20	391462	PLATE	1
~~21~~	~~213275~~	~~FLANGE~~	~~1~~
21	390494	FLANGE	1
22	390460	SHIM-.005	AR
22	390461	SHIM-.020	AR
22	390462	SHIM-.062	AR
~~23~~	~~16768~~	~~FITTING-LUBE~~	~~1~~
23	16049	FITTING-LUBE	1
24	156200	SEAL-OIL	1
25	44326	BEARING-BALL	1
26	44307	BEARING-BALL	1
27	12921	SNAP RING	1
28	156205	SEAL-OIL	1
29	213274	SHAFT	1
30	37065	SNAP RING	1
31	156206	CAPSCREW-1/2 UNF X 2 1/4	4
32	156192	SNAP RING	1
33	128528	BOLT-5/8 UNC X 1 1/4 G8	16
34	37562	CAPSCREW-1/2 UNF X 1 1/4 G5	3
35	156186	PLATE	3
36	156185	PLATE-LOCK	3
37	180397	PIN-GROOVE	3
38	15318	PLUG	1
39	15320	PLUG	1
40	156197	WASHER	3
41	156194	CUP-BEARING	6
41	156195	CONE-BEARING	6
42	156193	SNAP RING	3
43	154023	GEAR-PLANETARY PINION	3
44	156196	PIN	3
45	156183	PIN	3
46	154026	GEAR-PLANETARY PINION	3
47	156181	CUP-BEARING	6
47	156182	CONE-BEARING	6
48	156180	SNAP RING	3
49	180397	PIN-GROOVE	3
50	156185	PLATE-LOCK	3
51	156186	PLATE	3
52	16820	CAPSCREW-1/2 UNF X 1 G5	3
53	156184	WASHER-THRUST	3
54	167457	GEAR-SUN	1
55	34507	SNAP RING	1
56	183543	COUPLING	1
57	161246	PLATE	1
58	161244	SHIM-.005	AR
58	161245	SHIM-.020	AR
59	178144	CARRIER-BEARING	1
~~60~~	~~213589~~	~~COUPLING~~	~~1~~
60	392189	COUPLING	1
61	213611	CAPSCREW-1/2 UNC X 1 1/4	4
62	18588	CAPSCREW-1/2 UNC X 1 1/2 G5	12
62	15158	LOCKWASHER-1/2	12

BRAKE AND LINKAGE

PARKING BRAKE AND LINKAGE 2C03

PARKING BRAKE AND LINKAGE



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	204773	LEVER-PARKING BRAKE	1
1	210614	LEVER-HANDLE	1
2	204966	KNOB	1
3	.....	PIN-ROLL	1
4	.....	WASHER-SPRING	1
5	.....	O-RING	1
6	.....	SCREW-ADJUSTING	1
7	54871	PIN	1
8	54863	LINK	1
9	77584	BRACKET-MOUNTING	2
10	119878	SPACER	1
11	127876	CLAMP	1
12	127875	SPACER	2
13	127874	SPACER	2
14	54861	PIN	1
15	18515	WASHER	1
16	15213	COTTER-3/32 X 1	1
17	54872	RIVET	1
18	54864	BRACKET-PIVOT	2
19	54865	SPACER	1
20	54873	SPACER	2
21	210615	SPACER	2
22	210616	FITTING	1
23	210617	SPACER	1
24	54860	TUBE-ADJUSTING	1
25	156243	PLATE-SUPPORT, RH	1
26	15055	NUT-5/16 UNC	4
27	15155	LOCKWASHER-5/16	4
28	191342	CABLE-PARKING BRAKE	1
28	128408	CLAMP	1
28	15155	LOCKWASHER-5/16	1
28	15055	NUT-5/16 UNC	1

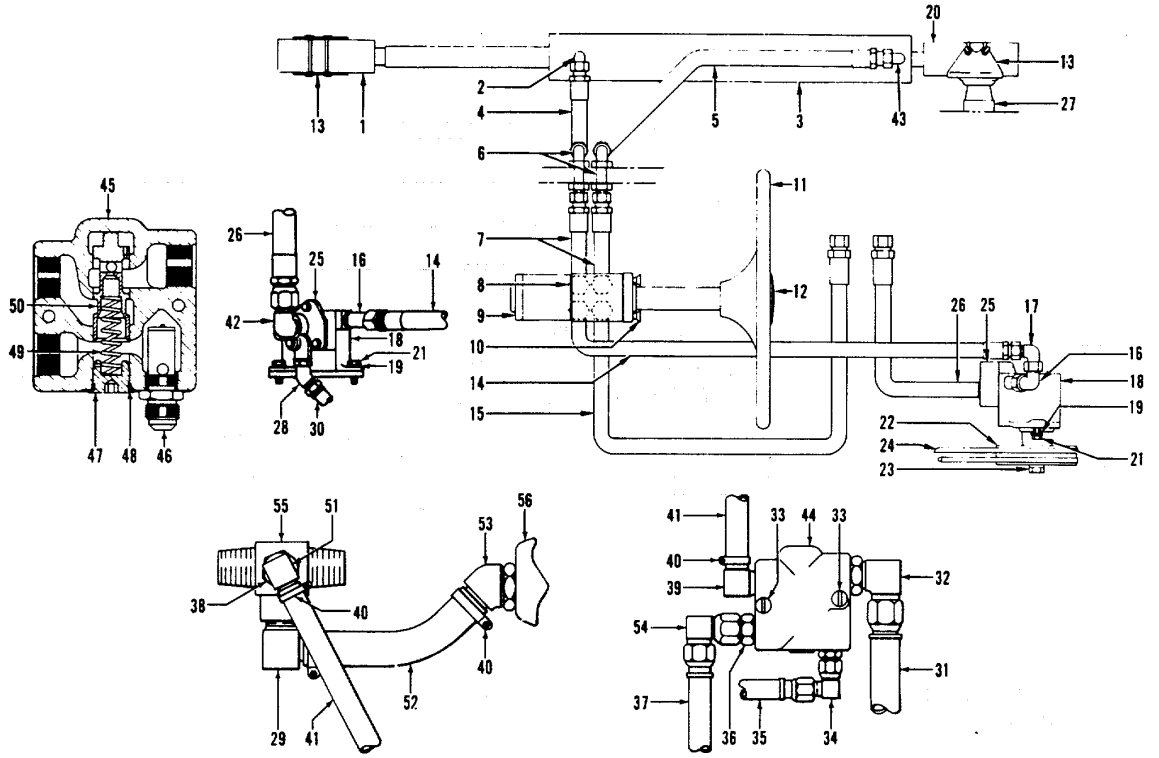
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
29	16782	CAPSCREW-5/16 UNC X 2 1/4 G5	4
30	156242	PLATE-SUPPORT, LH	1
31	16080	CAPSCREW-3/8 UNC X 3/4	2
32	163739	CAPSCREW-SPECIAL	12
33	15225	COTTER-1/8 X 1	1
34	21110	NUT-CASTLE	1
35	156245	SPACER	1
36	191140	BRAKE	1
36	191341	DRUM-BRAKE	1
37	163734	PLATE-BACKING	1
38	172264	LEVER-OPERATING	1
39	191345	BRAKE SHOE AND LINING	2
40	77717	SPRING-RETURN	1
41	194190	KIT-PAWL	2
42	164199	ROLLER	1
43	142	PIN-ROD END	1
44	15212	COTTER-3/32 X 3/4	1
45	141	ROD END	1
46	15026	NUT-JAM, 3/8 UNF	1
47	213276	HUB	1
~~47~~	~~* 390721~~	~~HUB~~	~~1~~
~~47~~	~~* 390697~~	~~SEAL~~	~~1~~
~~47~~	~~* 391520~~	~~WASHER~~	~~1~~
48	139773	SWITCH-MICRO	1
49	165786	COVER	1
50	16743	LOCKWASHER-#6	2
51	12425	NUT-#6 UNF	2
52	15155	LOCKWASHER-3/16	2
53	17484	CAPSCREW-5/16 UNF X 3/8 G5	2
54	18815	SCREW-#6 UNF X 1 1/4	2

~~* USED ONLY ON C540A~~

STEERING SYSTEM

STEERING CONTROL 2D04
STEERING CYLINDER AND SOCKETS .. 2D07
~~STEERING PUMP 0A3 AND 4 236 DL ..... 2D0L~~
STEERING PUMP-3-53 DSL 2D07
STEERING SYSTEM 2D03
STEERING TRUNNION AND DRUMS 2D05

STEERING SYSTEM



KEY

~~A-FOR GAS ENGINE.~~

~~B-FOR 4-236 DIESEL ENGINE.~~

C-FOR 3-53 DIESEL ENGINE.

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	B	C
1	.....	SOCKET-ROD END, SEE 2007 REF. 17	1	1	1
2	17306	ELBOW	1	1	1
3	.....	CYLINDER-STEERING, SEE 2007 REF. 1	1	1	1
4	96522	HOSE-HYDRAULIC	1	1	1
5	73470	HOSE-HYDRAULIC	1	1	1
6	16458	ELBOW	2	2	2
6	14761	NUT	1	1	1
7	155164	HOSE-HYDRAULIC	2	2	2
8	16541	CONNECTOR	4	4	4
8	16484	O-RING	1	1	1
9	.....	CONTROL-STEERING, 2004	1	1	1
10	139140	CAPSCREW-3/8 UNC X 1 1/2	2	2	2
11	155387	WHEEL-STEERING	1	1	1
~~12~~	~~155459~~	~~PLUG-BUTTON~~	~~1~~	~~1~~	~~1~~
13	141916	COVER-DUST	2	2	2
~~14~~	~~76230~~	~~HOSE-TO TEE~~	~~1~~		
~~14~~	~~155464~~	~~HOSE-TO STEERING CONTROL~~	~~..~~	~~1~~	~~..~~
15	158406	HOSE-TO OIL COOLER	1	1	1
~~16~~	~~169725~~	~~ELBOW SPECIAL~~	~~1~~	~~1~~	~~..~~
~~16~~	~~16586~~	~~LOCKNUT~~	~~1~~	~~1~~	~~..~~
~~16~~	~~16484~~	~~O-RING~~	~~1~~	~~1~~	~~..~~
~~17~~	~~16989~~	~~ELBOW~~	~~1~~	~~..~~	~~..~~
~~18~~	~~.....~~	~~PUMP-STEERING, 2006~~	~~1~~	~~1~~	~~..~~
~~19~~	~~15134~~	~~WASHER-3/8~~	~~2~~	~~..~~	~~..~~
19	15924	LOCKWASHER-1/2	..	..	4
19	15156	LOCKWASHER-3/8	2	2	2

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	B	C
20	.....	SOCKET-ANCHOR END, 2007 REF. 17	..	1	1
~~21~~	~~16805~~	~~CAPSCREW-3/8 UNC X 1 G5~~	~~..~~	~~..~~	~~..~~
~~21~~	~~16054~~	~~CAPSCREW-3/8 UNF X 1 G5~~	~~..~~	~~..~~	~~..~~
21	18549	CAPSCREW-3/8 UNC X 5 G5	..	..	2
~~22~~	~~156940~~	~~SHEAVE~~	~~..~~	~~..~~	~~..~~
23	15135	WASHER-1/2	..	..	..
23	17408	LOCKNUT-1/2 UNF	..	..	..
24	....	V-BELT SET, 1B06 REF. 72	..	..	..
25	169948	MANIFOLD-PUMP INLET	..	..	..
25	169947	MANIFOLD-PUMP INLET	..	1	..
25	179805	GASKET-MANIFOLD	..	..	..
25	12949	CAPSCREW-[illegible] UNC X 3/4	3	3	..
25	164368	WASHER	..	2	..
25	18425	LOCKWASHER-1/4	..	2	..
26	177455	HOSE-TO FILTER	..	..	..
26	177456	HOSE-TO FILTER	..	1	..
26	177458	CONNECTOR	..	..	..
26	16486	O-RING	..	..	..
~~27~~	~~176452~~	~~CLAMP~~	~~..~~	~~..~~	~~..~~
27	.....	STUD-BALL, 2005 REF. 9	..	1	1
~~28~~	~~131461~~	~~ELBOW-45 DEGREE~~	~~..~~	~~..~~	~~..~~
~~28~~	~~16585~~	~~LOCKNUT~~	~~..~~	~~..~~	~~..~~
~~28~~	~~16483~~	~~O-RING~~	~~..~~	~~..~~	~~..~~
29	110177	NIPPLE-FILTER END	..	..	1
~~30~~	~~76230~~	~~HOSE-TO HYDRAULIC TANK~~	~~..~~	~~..~~	~~..~~
~~30~~	~~155069~~	~~CLAMP~~	~~..~~	~~..~~	~~..~~

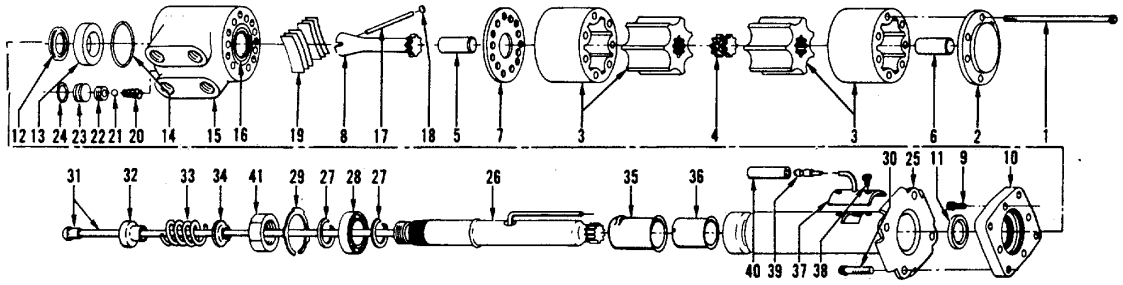
STEERING SYSTEM

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. C
31	181366	HOSE-FROM STEERING PUMP	1
32	16561	ELBOW	2
32	16588	LOCKNUT	1
32	16486	O-RING	1
33	18347	SCREW-1/4 UNC X 2 1/2	2
33	15154	LOCKWASHER-1/4	2
33	15054	NUT-1/4 UNC	2
34	16989	ELBOW	1
35	89440	HOSE-TO TEE	1
36	16542	CONNECTOR	1
36	16587	LOCKNUT	1
36	16485	O-RING	1
37	126121	HOSE-TO STEERING CONTROL	1
38	15343	BUSHING	1
39	17775	NIPPLE	1
39	16588	LOCKNUT	1
39	16486	O-RING	1
40	127045	CLAMP	4
41	169130	HOSE-TO TEE	1
~~42~~	~~177459~~	~~ELBOW~~	
~~42~~	~~16587~~	~~LOCKNUT~~	

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. C
~~42~~	~~16485~~	~~O-RING~~	
43	15306	PLUG	1
43	175873	ELBOW	1
44	169128	VALVE-FLOW DIVIDER	1
45	.....	BODY	1
46	161878	VALVE-RELIEF	1
47	191873	CAP-END	1
48	161874	O-RING	1
49	187436	SPRING	1
50	.....	PISTON	1
51	16165	ELBOW-HOSE TO TEE	1
52	157532	HOSE	1
53	141908	ELBOW-45 DEGREE	1
53	16487	O-RING	1
54	16882	ELBOW	1
55	.....	TEE-SPECIAL, SEE 2A05 REF. 32	1
56	.....	PUMP-STEERING, 2D07	1

~~*FOR TRUCKS WITHOUT HORN.~~

STEERING CONTROL

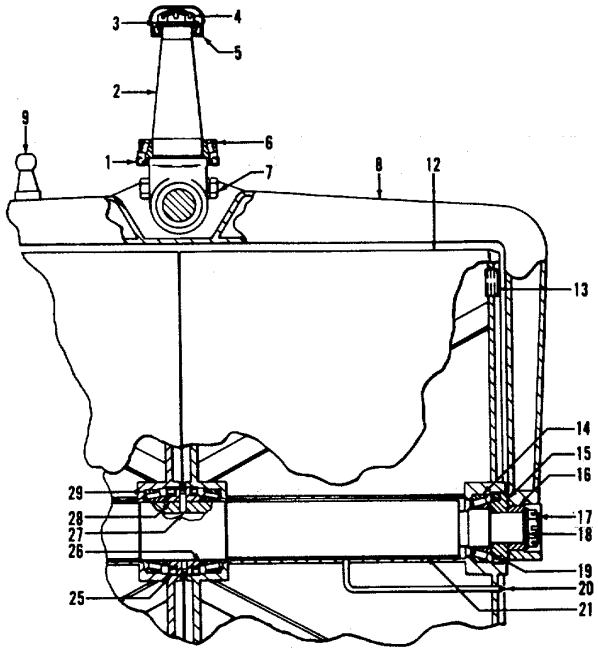


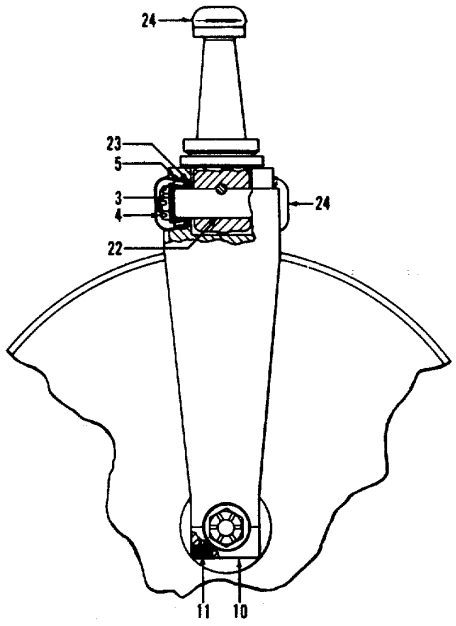
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
	163616	CONTROL-STEERING	1
	241103	CONTROL	1
1	158826	CAPSCREW	7
2	158827	CAP-END	1
3	158828	GEAR SET	2
4	158829	SPLINE	1
5	158830	SPACER	1
6	138907	SPACER	1
7	158831	PLATE	1
8	158832	DRIVE	1
9	138145	CAPSCREW	4
10	158833	CAP-HOUSING	1
11	158834	SEAL-OIL	1
12 *	158835	SEAL-QUAD RING	1
13	158836	BUSHING-CAP LOCATER	1
13	198028	RACE-BEARING	2
13	198029	LOCATOR-BEARING	1
13	209627	NEEDLE BEARING-THRUST	1
14 *	158837	O-RING	1
15 ¤	.....	HOUSING-VALVE	1
16 ¤	.....	SLEEVE AND SPOOL	1
17 ¤	158839	PIN-CENTERING	1
18 ¤	158846	PIN-DISC	2
19 ¤	158840	SPRING-CENTERING	6
20 ¤	158841	SPRING	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
21 ¤	189586	BALL-STEEL, 1/4	1
22 ¤	158843	SEAT-CHECK	1
23 ¤	158844	PLUG-SEAL	1
24 *¤	158845	O-RING	1
25	165316	COLUMN-STEERING	1
25	165317	TUBE AND FLANGE	1
26	165318	SHAFT	1
27	159764	SNAP RING	2
28	159703	BEARING	1
29	138145	RING-RETAINING	1
30	159812	CAPSCREW-3/8 UNC X 3/4	2
31	165201	TERMINAL AND WIRE	1
32	194851	INSULATOR-CONTACT	1
33	165203	SPRING-CONTACT	1
34	165204	WASHER-CONTACT	1
35	194847	RING-CONTACT	1
36	194846	INSULATOR-CONTACT RING	1
37	241102	KIT-HORN BRUSH	1
38	16606	SCREW	2
39	165314	TERMINAL-WIRE	1
40	165313	CONNECTOR	1
41	161865	NUT-13/16 NEF	1

*INCLUDED IN SEAL KIT 158847.
¤INCLUDED IN CONTROL PARTS KIT 189585.

STEERING TRUNNION AND DRUMS



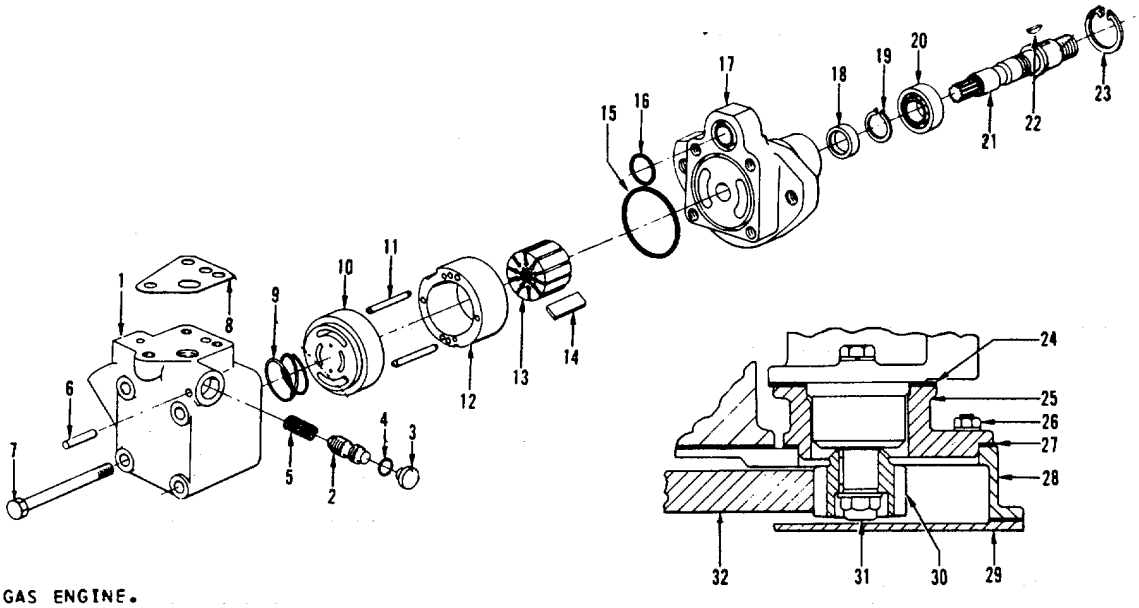


REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
1	156220	SEAL-OIL	1
~~2~~	~~= 191409~~	~~PIN-KING~~	~~1~~
2	# 391352	PIN-KING	1
3	192427	WASHER	5
4	193006	NUT-JAM	3
4	15250	COTTER-3/16 X 3	3
5	230324	CUP-BEARING	3
5	230325	CONE-BEARING	3
6	230389	CUP-BEARING	1
6	230390	CONE-BEARING	1
7	18667	CAPSCREW-1/8 UNC X 2 1/4	2
7	15166	WASHER-1	2
8	390084	YOKE-STEERING	1
~~8~~	~~C 390673~~	~~YOKE-STEERING~~	~~1~~
9	# 390122	STUD-BALL	1
10	.....	CAP	2
11	187238	CAPSCREW-5/8 UNF X 2 1/2	4
12	390088	DRUM-STEERING	2
~~12~~	~~C 390679~~	~~DRUM-STEERING~~	~~2~~
12	15316	PLUG	2
13	15320	PLUG	2
14	390104	CONE-BEARING	2
14	390105	CUP-BEARING	2
15	390107	SPACER	2
16	390108	SPACER	2

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
17	193006	NUT-JAM	2
17	15250	COTTER-3/16 X 3	2
18	191412	WASHER	2
19	390106	SEAL-OIL	2
20	16007	FITTING-LUBE	2
21	390096	SHAFT-AXLE	1
~~21~~	~~C 390677~~	~~SHAFT-AXLE~~	~~1~~
~~22~~	~~= 209030~~	~~PIN~~	~~1~~
22	# 391351	PIN	1
23	156223	SEAL-OIL	2
24	156224	CAP	3
25	44525	SEAL-OIL	2
26	390101	SHIM	AR
26	390102	SHIM	AR
26	390103	SHIM	AR
27	19960	PIN-1/2 X 1 3/4	2
28	390099	SPACER	1
29	97623	CONE-BEARING	2
29	97626	CUP-BEARING	2

~~#FIRST USED ON S/N 8896-3155 & A146C-1510~~
~~FLAST USED ON S/N 8896-3154 & A146C-1509~~
~~#FIRST USED ON SERIAL NUMBER 8896-3001~~
~~BUGGD ON G340A ONLY~~

STEERING PUMP



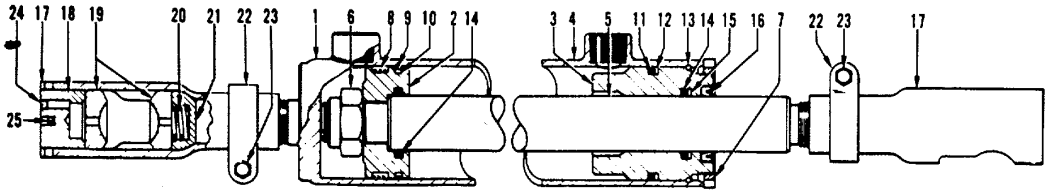
KEY
A-FOR GAS ENGINE.
B-FOR 4-236 DIESEL ENGINE.

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	QTY. B
	191756	PUMP-STEERING	1	..
	191757	PUMP-STEERING	..	1
1	192327	COVER	1	1
2	147990	VALVE-CONTROL	1	1
3	192326	PLUG	1	1
4	* 176037	O-RING	1	1
5	236024	SPRING	1	1
6	236026	PIN	1	1
7	133820	CAPSCREW	4	4
8	* 119963	GASKET	1	1
9	96952	SPRING	1	..
9	155056	SPRING	..	1
10	133816	PLATE-PRESSURE	1	1
11	54767	PIN	2	..
11	236011	PIN	..	2
12	159064	KIT-CARTRIDGE	1	..
12	133817	KIT-CARTRIDGE	..	1
12	192319	RING	1	..
12	164525	RING	..	1
13	147528	ROTOR	1	..
13	164526	ROTOR	..	1
14	147527	KIT-VANE, 10 VANES	1	..
14	236012	KIT-VANE	..	1
15	* 176038	O-RING	1	1
16	* 176039	O-RING	1	1
17	.....	BODY	1	1

REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY. A	QTY. B
18	* 176040	SEAL-OIL	1	1
19	169009	SNAP RING	1	1
20	97847	BEARING	1	1
21	97846	SHAFT	1	1
22	236018	KEY	1	1
23	97850	SNAP RING	1	1
24	982161	GASKET-STEERING PUMP TO DRIVE ADAPTER	..	1
25	168889	ADAPTER-STEERING PUMP	..	1
26	983271	STUD-ADAPTER TO TIMING GEAR HOUSING	..	4
26	15005	NUT-5/16 UNF	..	4
26	15155	WASHER-SPRING, 5/16	..	4
27	168890	GASKET-ADAPTER TO TIMING GEAR HOUSING	..	1
28	.....	HOUSING-TIMING GEAR, 1C03 REF. 30	..	1
29	.....	COVER-TIMING GEAR HOUSING, 1C03 REF. 2	..	1
30	168887	GEAR-STEERING PUMP	..	1
31	983331	NUT-STEERING PUMP RETAINING	..	1
31	992633	WASHER	..	1
32	.....	GEAR-IDLER, 1C03 REF. 26	..	1

*INCLUDED IN SEAL KIT 133821.

STEERING CYLINDER AND SOCKETS

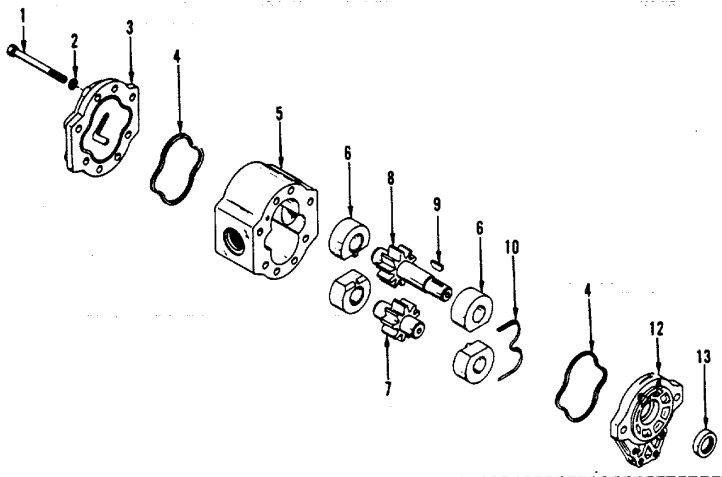


REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
~~1~~	~~157879~~	~~STEERING CYLINDER~~	~~1~~
1	390663	STEERING CYLINDER	1
2	162065	PISTON	1
3	162066	BEARING	1
4	162067	BARREL	1
~~5~~	~~162068~~	~~ROD-PISTON~~	~~1~~
5	223640	ROD-PISTON	1
6	162069	LOCKNUT	1
7	162070	NUT-BEARING	1
8 *	162073	RING-WEAR	1
9 *	162076	RING-PISTON	1
10 *	162074	O-RING	1
11 *	57664	O-RING	1
12 *	162075	RING-BACK UP	1
13 *	165615	RING-LOCK	1
14 *	79974	O-RING	2
15 *	155105	RING-BACK UP	1
16 *1	162072	SEAL-WIPER	1
17	390124	SOCKET	1
17	157823	SOCKET-BALL	1
18	133535	PLUG-ADJUSTMENT	1
20	132546	SPRING	1
21	132547	SEAT-SPRING	1
22	14122 A	CLAMP	1
23	15517	CAPSCREW-1/2 UNF X 2-1/2	1
23	15158	LOCKWASHER-1/2	1
23	15008	NUT-1/2 UNF	1
24	15483	PLUG	2
25	15284	COTTER-1/4 X 3 1/2	2

*INCLUDED IN SEAL KIT 223641.
~~•FIRST USED ON SERIAL NUMBER B006 3001~~
~~#FIRST USED ON SERIAL NO. B006 3105.~~

STEERING PUMP

FOR 3-53 DIESEL ENGINE



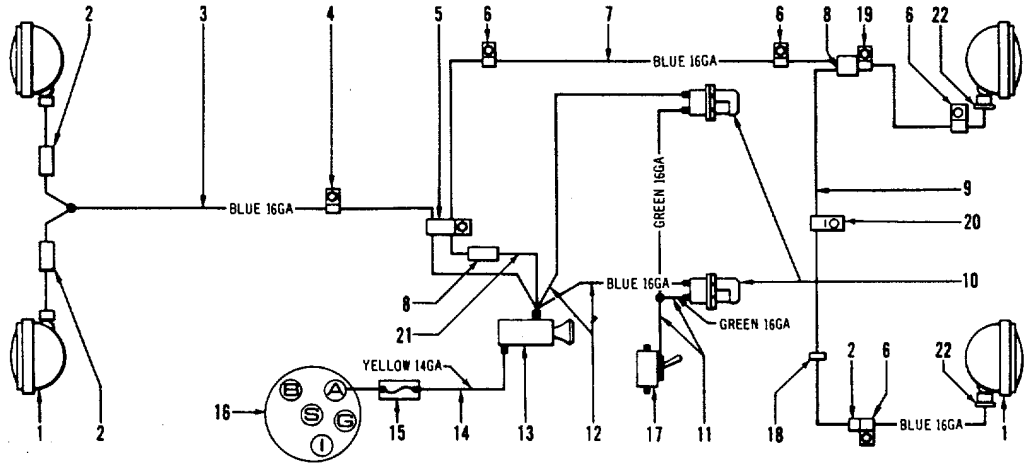
REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
	169150	PUMP-STEERING	1
1 *	129446	CAPSCREW	6
2 *	129447	WASHER	6
3	170078	COVER-REAR	1
4 ¤	168941	GASKET-SEAL	2
5	.....	BODY	1
6 *	168947	BEARING	4
7 %	984513	GEAR-DRIVEN	1
8 %	.....	GEAR-DRIVE	1
9 *	206	KEY	1
10 ¤	155806	GASKET-SEAL	1
12	158908	COVER-FRONT	1
13 ¤	235933	SEAL-SHAFT	1
	129445	KIT-MAJOR	1
	158913	KIT-MINOR	1
	129444	KIT-GEAR	1

*INCLUDED IN MAJOR KIT.
¤INCLUDED IN MINOR KIT.
%INCLUDED IN GEAR KIT.

OPTIONAL EQUIPMENT

LIGHTING SYSTEM 2E03

LIGHTING SYSTEM



REF. NO.	HYSTER PART NO.	NAME OF PART 1 2 3 4	QTY.
	159563	LIGHTING GROUP	1
1	139646	HEAD LIGHT	4
1	156776	ELEMENT-SEALED BEAM	1
1	149519	RETAINER-ELEMENT	1
1	156777	SHELL	1
1	149513	BUSHING-PIVOT	1
1	149514	WASHER	1
1	149516	NUT	1
2	42958	CONNECTOR-FEMALE	3
3	159566	WIRE-FRONT LIGHTS	1
4	124359	CLAMP	1
5	132131	CLAMP	1
6	132131	CLAMP	4
6	15913	LOCKWASHER-5/16	4
6	15055	NUT-5/16 UNC	4
7	159567	WIRE-REAR LIGHTS	1
8	73510	CONNECTOR-FEMALE, 2 TO 1 WIRE	2
9	159568	WIRE-REAR LIGHT TO CONNECTOR	1
10	159565	LIGHT-PANEL	2
10	182677	BULB-12 VOLT.	1
10	164301	LENS	1
10	164302	BASE	1
11	159570	WIRE-PANEL LIGHT GROUND	1
12	159569	WIRE-SWITCH TO PANEL LIGHT	1
13	62886	SWITCH-LIGHT	1
14	60416 A	WIRE-FUSED	1
15	21778	FUSE-20 AMP.	1
16	.....	SWITCH-IGNITION AND START, 1F03 REF. 29 AND 1F05 REF. 20	1
17	....	SWITCH-TOGGLE, 1F03 REF. 26 AND 1F05 REF. 16	1
18	107173	GROMME	1
19	124359	CLAMP	1
20	124359	CLAMP	1
20	15913	LOCKWASHER-5/16	1
20	15055	NUT-5/16 UNC	1
21	166197	WIRE-LIGHT SWITCH TO CONNECTOR	1
22	16637	WASHER-0.562	2

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30375	-	134936	G04
134938	-	58447	G05
158452	-	164134	G06
*1*64141-	-	172885	G07
173218 -	-	196285	G08
196431-	-	243606	G09
243608	-	984275	G10
984326	-	L199287	G11

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142	1A06	44	15115	1D07	16	15915	1D08	46	16711	1F04	9	17484	2C03	53
206	2D07	9	15127	1D08	23	15916	1F03	28	16713	1F09	22	17585	2A08	36
7882	1B04	29	15129	1E03	13	15919	1F06	46	16719	1B09	16	17697	2A06	59
9033	1B10	10	15132	1D12	11	15923	1D07	20	16720	1B04	65	17775	2D04	39
12425	2C03	51	15134	1A05	2	15924	2D03	19	16733	1E01	42	17781	2A06	26
12481	1C07	16	15135	1A06	26	15930	1F03	10	16741	1F09	44	17946	1F07	35
12815	1B09	12	15152	1A05	37	15931	1B04	65	16743	1D08	57	18202	1A06	36
12818	2A06	54	15154	1A07	29	15943	2A06	17	16752	1D08	32	18347	2D04	33
12833	2A06	25	15155	1A05	38	15995	2A08	26	16768	2B06	23	18425	2D03	25
12921	2B06	27	15156	1A05	32	16007	2D05	20	16775	1A05	34	18460	1F03	22
12948	1C07	1	15157	1B11	3	16049	2B06	23	16779	1B13	36	18461	1C04	26
12949	2D03	25	15158	1A05	21	16080	2C03	31	16782	2C03	29	18466	1A07	29
12955	2A11	46	15160	1B07	24	16085	1A06	23	16800	1C07	8	18473	2B04	87
13814	1B12	32	15162	1B11	18	16101	1E03	26	16805	1B06	27	18478	2B03	2
14122 A	2D07	22	15163	1B09	16	16114	1B14	18	16811	1D04	13	18496	1D04	2
14271	1E03	5	15165	1F07	8	16116	1A07	32	16814	1B13	32	18497	1A06	41
14273	1E03	9	15166	2D05	7	16126	1D11	27	16815	1B12	42	18498	1B06	47
14274	1E03	27	15175	1A05	34	16148	1F06	59	16816	1D07	3	18499	1B09	6
14358	1E03	7	15176	1C07	37	16149	1D11	32	16817	2A09	6	18500	2A10	12
14385	1B03	1	15180	1B07	9	16151	1F05	4	16818	1A05	38	18508	1B06	46
14386	1B04	60	15200	1D08	23	16165	2D04	51	16820	2B06	52	18511	1B09	6
14387	2A06	53	15212	1A06	45	16186	1F05	4	16823	2B05	7	18512	1B13	34
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14526	1B04	71	15250	2D05	4	16215	1D08	41	16829	1B07	18	18524	2A12	2
14546	1A07	17	15284	2D07	25	16275	1C07	31	16830	1A06	29	18525	1C06	8
14591	2B04	57	15302	1B14	1	16316	1B12	42	16833	1B07	23	18535	1A07	23
14596	2A08	68	15303	1C04	38	16374	1D05	12	16836	1F08	24	18536	1B06	56
14598	2A11	42	15306	1B12	23	16376	1D11	22	16863	1E03	21	18537	1B06	21
14603	2A06	7	15307	1D03	14	16377	1E03	12	16870	2B08	22	18540	2A06	79
14652	1A07	21	15310	1A05	29	16378	1D08	46	16882	2D04	54	18542	1D07	17
14678	1A07	42	15315	2B08	58	16379	1C05	24	16989	2D03	17	18543	1C07	11
14683	2A06	50	15316	2B06	16	16457	1A07	8	17040	2A06	55	18549	2D03	21
14761	2D03	6	15318	2B06	38	16458	2D03	6	17052	2A06	28	18555	1D07	5
15000	2A10	9	15320	2B06	39	16483	2D03	28	17112	2A06	17	18557	1C05	14
15002	1A05	37	15324	1F04	41	16484	2A06	3	17150	1B11	9	18559	1F09	42
15004	1D07	20	15329	1A07	28	16485	2A11	43	17154	1B10	23	18564	1C05	17
15005	1A05	34	15343	2D04	38	16486	2D03	26	17155	1F09	44	18570	1C05	15
15006	1A05	38	15346	2A06	52	16487	2A06	33	17158	1E01	36	18588	1A06	32
15007	1B12	6	15347	1B12	12	16526	1B08	10	17159	1B12	6	18589	2A11	47
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15012	1C07	6	15373	1A07	1	16561	2A06	6	17241	2A06	36	18620	1B11	17
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197068	2A06	69	213628	2A06	1	219923	2A11	31	229897	1E02	3	236012	2D06	14
197549	1B10	20	213683	1B10		219924	2A11	35	229898	1E02	5	236018	2D06	22
197551	1B10	2	213684	1B03	1	219925	2A11	32	229899	1E02	8	236024	2D06	5
197861	1A07	33	213685	1B04	13	219927	2A11	34	229931	1E02	16	236026	2D06	6
197862	1A07	33	213686	1B04	14	219928	2A11	8	229932	1E02	20	236066	1F07	11
198028	2D04	13	213687	1B04	14	219929	2A11		230324	2D05	5	236068	1F07	10
198029	2D04	13	213689	1B04	41	219930	2A11	29	230325	2D05	5	236069	1F07	3
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198881	1B04	70	213692	1B06	4	219932	2A11	27	230390	2D05	6	236074	1F07	43
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199401	1A07	26	213695	1B06	5	219936	2A11	22	230506	2A14	67	236081	1F08	53
199562	2A09	17	213696	1B06	5	219937	2A11	21	230507	2A14	68	236082	1F08	54
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199933	1D03	36	213700	1B06	70	219941	2A11	17	230511	2A13	2	239995	2B08	43
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1 Kilometer = 1000 Meters = 0 621 Miles

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1 Gram = 0 001 Kilograms = 1000 Milligrams = 0 035 Ounces
1 Kilogram = 1000 Grams = 2 2 Lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1 1 Short Tons

LIQUID MEASURE

1 Milliliter = 0 001 Liters = 0 0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33 82 Fluid Ounces

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1 Sq Meter = 10,000 Sq Centimeters = 10 76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0 386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0 06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35 31 Cu Feet

TEMPERATURE

$\frac{5}{9}(°F - 32) = °C$
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32 2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
$\frac{9}{5}\,°C + 32 = °F$

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TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2 540
Feet	Meters	0 305
Yards	Meters	0 914
Miles	Kilometers	1 609
Square Inches	Square Centimeters	6 451
Square Feet	Square Meters	0 093
Square Yards	Square Meters	0 836
Square Miles	Square Kilometers	2 590
Acres	Square Hectometers	0 405
Cubic Feet	Cubic Meters	0 028
Cubic Yards	Cubic Meters	0 765
Fluid Ounces	Milliliters	29 573
Pints	Liters	0 473
Quarts	Liters	0 946
Gallons	Liters	3 785
Ounces	Grams	28 349
Pounds	Kilograms	0 454
Short Tons	Metric Tons	0 907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6 895
Miles per Gallon	Kilometers per Liter	0 425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0 394
Meters	Feet	3 280
Meters	Yards	1 094
Kilometers	Miles	0 621
Square Centimeters	Square Inches	0 155
Square Meters	Square Feet	10 764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0 386
Square Hectometers	Acres	2 471
Cubic Meters	Cubic Feet	35 315
Cubic Meters	Cubic Yards	1 308
Milliliters	Fluid Ounces	0 034
Liters	Pints	2 113
Liters	Quarts	1.057
Liters	Gallons	0 264
Grams	Ounces	0 035
Kilograms	Pounds	2 205
Metric Tons	Short Tons	1 102
Newton-Meters	Pound-Feet	0 738
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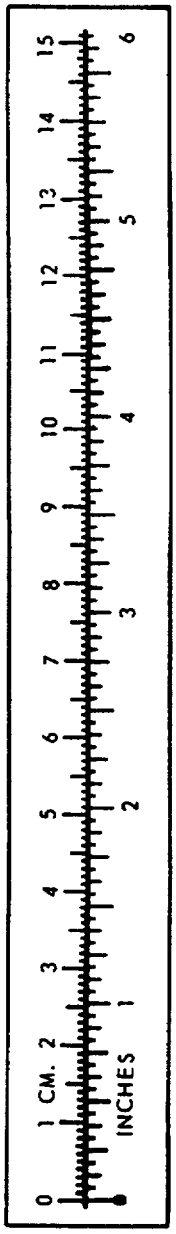
Kilometers per Liter	Miles per Gallon	2 354
Kilometers per Hour	Miles per Hour	0 621



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